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ABSTRACT

This publication is the first from the Leverhulme program of study, which focused on the major strategic options likely to be available to higher education institutions and policy-making bodies in the 1980s and 1990s. It resulted from a specialist seminar on higher education and the labor market. The chapters are: "Employers' Perceptions of Demand" (Laurence C. Hunter); "Technological Manpower" (Derek L. Bosworth); "Response to Change in the United States" (Richard B. Freeman); "Higher Education Policy" (Maurice Peston); and "The Challenge of Market Imperatives" (Robert M. Lindley). Lindley notes that the British higher education system has never come to grips with the role it might play in economic development and examines some areas of need and improvement: the search for more students; the need to get the labor market more involved in the environment of higher education and to get education to respond to market need with qualified persons; the role of higher education in the screening and credentialism process; to encourage industry's role in funding and organizing higher education; and stabilizing the labor market environment. It is concluded that labor market issues have to be handled at a more sophisticated level than the debate about manpower alone. (LC)

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HIGHER EDUCATION AND THE LABOUR MARKET

Robert M. Lindley
(Editor)
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HE 014 588

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THE LEVERHULME PROGRAMME
OF
STUDY INTO THE FUTURE OF HIGHER EDUCATION

This is the first publication of a programme of study focusing informed opinion and recent research findings on the major strategic options likely to be available to higher education institutions and policy-making bodies in the 1980s and 1990s. The programme has been made possible by a generous grant from the Leverhulme Trust and is entirely independent of governmental or other organizational pressure. The present monograph arises out of a specialist seminar on higher education and the labour market held in May 1981 and chaired by Sir Michael Clapham. We are extremely grateful to Sir Michael for his chairmanship, as well as for his considerable interest in the programme of study as a whole.

The fundamental question facing higher education is the extent to which consensual arrangements and assumptions that generally worked well during the long postwar period of its expansion can cope with the much more stringent conditions likely to prevail in the 1980s and 1990s. Is there sufficient common purpose amongst the various institutions and interest groups that constitute 'the higher education system' to permit the development of viable long-run policy objectives or must higher education policy increasingly become merely the outcome of a struggle for survival and dominance among conflicting interests and ideas?

This is both a substantive and methodological question. Substantively it will be faced squarely in the final report of the programme of study. Methodogically it will be tackled in the way the conclusions of that final report are reached.

In brief the study is an experiment in formulating long-term strategies openly, taking into account the best available specialist knowledge about a complex system, the legitimate interests of a wide range of conflicting pressure groups, and wider public interests as perceived by disinterested individuals with no direct day-to-day involvement in higher education. The final recommendations will be the result of an iterative process in which proposals are made, then discussed, then revised, then reconsidered. Stage one is to commision research reviews by acknowledged experts in various specialist areas. Stage two is a seminar at which others with detailed knowledge and experience of the area discuss these reviews. Stage three is publication of the reviews together with a report of the discussion and of the policy implications highlighted by it. Stage four is wider debate in the press and in specially convened conferences. Stage five is reconsideration of the policy issues in the light of the wider reaction. Stage six is the preparation of a final report. A seventh stage is of course intended, in which public authorities and institutions of higher education will take up the report's recommendations.

Publication of this monograph represents the conclusion of the first three stages in that part of the programme concerned with higher education and the labour market. The programme has started with this topic because the most likely shift in the orientation of higher education policy during the next decade will be towards encouraging the system to respond more directly to changing employment needs. A cool appraisal of the theoretical and practical issues involved is felt to be desirable before irrevocable decisions with long-term implications are taken.

There will be six other main areas of inquiry and these are summarized below.

DEMAND AND ACCESS

This topic follows naturally from the first in that any serious attempt at orientating higher education to meet labour market needs could have considerable implications for the criteria used in determining access to higher education both in general terms and in the selection of different individual students. Other criteria determining access would also be affected, for instance in the reduction of inequalities. The seminar will take into account issues raised by proposals to increase the part played by higher education in the continuing education of adults.

INSTITUTIONAL ADAPTATION AND CHANGE

Whatever measures are taken during the 1980s to relate the higher education system more closely to the needs of society and to the demands of new categories of students, there is a strong probability that before the end of the decade there will be some excess capacity. There is already some evidence of apparent mis-match between the patterns of provision and the demand for places. Unless some careful co-ordination is undertaken the decline in the age groups from 1984 onwards will make this problem very much worse. At the level of individual institutions there will be considerable interest in appropriate strategies for survival and growth; while for the system as a whole there needs to be a concern for some measure of rationalization, so that any reduction in capacity that does occur does as little harm as possible to the essential fabric of higher education. A single seminar obviously cannot produce a detailed plan for rationalization, institution by institution. However, it should be possible to consider and make recommendations about the principles which need to be followed when the decline in the birthrate begins to make itself seriously felt in the late 1980s.

THE RESEARCH FUNCTION

Universities are institutions whose function is teaching and research. In pursuing parity of esteem, many polytechnics have claimed equal treatment with regard to funding for research. However, there is ambiguity concerning the relationship that does exist, and that ought to exist, between research and teaching in higher education institutions. There is considerable disagreement, for example, about whether in practice, in the activities of academic staff, research is competitive with, or complementary to teaching. The actual and desirable relationship between 'research', 'scholarship', and consultancy activities is not at all clear. An unspecified proportion of the UGC grant to universities is normally deemed to be for research and scholarship. At the same time earmarked funds for scientific research are made available through the research councils. Increasingly, universities and polytechnics have undertaken contractual research for both public and private sector activities. An attempt at rationalizing the public finance of research was made by the Rothschild Report in 1971, but its recommendations have largely been ignored. A careful examination is needed of the place and organization of research in higher education institutions.

THE TEACHING FUNCTION

The largest task of higher education institutions is the teaching of students. The scope of this activity ranges from training in specific vocational skills to the provision of opportunities for self-development in a wide range of general analytical and creative activities. Since 1960 there has been a huge increase in the curricular content of higher education; at the same time considerable attention has been devoted to the improvement of teaching, particularly through the use of new educational technologies. However, with rather few exceptions, of which the Open University is the most outstanding example, there has been little change in the ways in which the teaching function has been carried out. During the 1980s new problems are likely to emerge, particularly as a result of the aging of the stock of teachers and the lack of opportunities for mobility within higher education and out of it. The existence of a healthy higher education system in the 1990s is likely to depend at least as much on the attention that is paid to the content and methods of teaching as on external circumstances. This seminar will therefore give consideration to what is taught and how it is taught.

MECHANISMS OF FINANCE

There are two levels of discussion about financial policy for higher education which ought to be brought together. The first is consideration of radical changes in the financial arrangements, such as greater dependence on private finance of various kinds and the replacement of student grants by loans. The second is whether the existing financial mechanisms for disbursing public funds do in fact ensure an allocation of resources which is consistent with public policy objectives. The tension between academic freedom and public accountability is one which needs to be kept constantly under review.

STRUCTURE AND GOVERNANCE

The Robbins Report recommended the establishment of what was in effect a unitary system of higher education dominated by the universities. Almost immediately, a binary system was established in which government policy set up a competitive sector (the polytechnics) with parity of esteem with the universities and financed through the local authorities. Subsequently, largely as a result of the reduction in the demand for teachers, many colleges of education have been turned into a third sector purportedly catering for a rather different clientele from the second. There is also, of course, the Open University, and there remain a number of further education colleges, outside the polytechnics, which offer degree-level work. Furthermore, the forthcoming decline in the size of the age group which normally enters higher education is likely to encourage each category of institution to attempt to move into new areas. In the light of this kind of consideration, a careful review of the existing situation and the options for future development seems opportune.

The last of these research-based seminars will take place in late summer 1982. The material produced in the course of debate on their separate topics will be brought together at one further seminar. A final report setting out the conclusions and policy recommendations of the programme as a whole will be published in 1983.

The scope of the Leverhulme programme is very wide. The need for a major review of higher education has been recognized for some time and has been given special impetus by the publication during 1980 of major reports having strong implications for its future: those of the Committee of Enquiry into the Engineering Profession (*Engineering our Future*) and the House of Commons Education, Science and Arts Committee (*The Funding and Organisation of Courses in Higher Education*). The House of Commons Committee acknowledges the initiative behind the present programme and in the closing remarks of its report states: 'We believe that higher education is at a watershed in its development and that the time is ripe for a great national debate . . . .' The Leverhulme programme is intended to contribute to that debate by offering both a structure within which the main issues can be considered and assessment of the evidence on which future policy should be based.

Professor Gareth Williams
Programme Director

FOREWORD

by Sir Michael Clapham

The Leverhulme seminar on higher education and the labour market was the first of a series whose themes overlap and whose conclusions can only emerge towards the end of the whole exercise. At this early stage the papers which were presented and are printed here, and the discussion on them which Dr Lindley reviews in the final chapter, raise more questions than they answer. This is not surprising, since our topic was one which has been debated over centuries without any universally accepted answer. The protagonists of the extreme views have been positive enough. Plato implied and Aristotle stated that the object of education was simply virtue: usefulness was to be taken into account only in the training of slaves. Adam Smith, writing for a society without helots, was equally clear; the purpose of education was to serve the market and market forces would improve education: 'The privileges of graduates are a sort of statutes of apprenticeship, which have contributed to the improvement of education.' I would judge that the tenor of our discussions was nearer Adam Smith than Aristotle; whereas re-reading the report of the Robbins Committee, now nearly twenty years old, I sense that its rejection of dirigism owes as much to Aristotelian assumptions as to the conclusion that it is impracticable.

The impracticability of relating education to the labour market was a fear haunting even those who most wished to do so: the theme of inadequacy of information will recur throughout these pages. This is not surprising: information relates to the past, and the labour market a graduate will stand in is three or four years ahead when he enters on higher education; five to seven years ahead when the course he enters is planned; perhaps ten years ahead when he decides at school between options which will eventually limit his choice of subject at university. For a 'futures' market there can be no information, only prediction, and prediction of a market a decade ahead, while not impossible, is a major exercise involving a range of disciplines and liable, however carefully it is done, to incorporate some gross errors: for while the direction of probable invention can often be discerned by the skilled observer, the timing of invention is unpredictable. One day perhaps an enlightened Higher Education Commission will do what one large and capital-intensive company does: spend a substantial sum once in a quinquennium on a survey of the probable developments in science, technology and society over the next twenty years with a view to judging the probable requirement of skills at the end of the first ten. No shorter time-scale is adequate.

Our discussion was mainly about the response or lack of response of degree-level education to the labour market. It must not be forgotten that the labour market will ultimately respond to ideas generated in the centres of higher education. I am not thinking only of scientific ideas; of the nucleur power industry's origins in the work of the great physicists carried out thirty to fifty years before the first reactor was built; of the branch of the pharmaceutical industry which sprang with a smaller time lag from the work of Florey and Chain; or of the revolutions in agriculture (at least) which will emerge from the work of Watson and Crick in the 1950s. In the social sciences too the great thinkers generate ideas which create 'markets' for those who develop them: consider the market for economists pre- and post-Keynes. Indeed it is salutary for academics seeking dutifully to subserve the economic machinery of the country to recall Hume's dictum: 'Though men be much governed by interest, yet even interest itself, and all human affairs, are entirely governed by *opinion*.' The debate we are beginning here must not ignore the fact that the labour market is in a state of continuous change, and that the ideas which generate the change are a more important part of the contribution by higher education to the economy than an improvement in the speed of reaction to that change.

Michael Clapham
Seminar Chairman

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As convenor of the Leverhulme seminar on higher education and the labour market and as editor of this book, I am indebted to Sir Michael Clapham for his chairmanship of the seminar and for useful suggestions when preparing the report of its proceedings. I am grateful to the invited participants, especially those who acted as discussants; to Tessa Blackstone, Sheila Lindley, Michael Shattock and Robert Wilson for various discussions of the issues covered by the seminar and comments on one or more of the draft chapters; and to Gareth Williams whose ubiquitous presence as director of the Leverhulme programme, seminar discussant and general critic has been much appreciated.

Special thanks are due to Betsy Breuer who was responsible for arranging the seminar, to the Research Advisory Group for discussion of its format and content, and to Sally Kington who supervised production of the resulting book.

Finally, I should like to thank my fellow authors for agreeing to contribute to the seminar in the first place, for helpful discussions of the subject matter and their comments on a draft of the final chapter, and for their diligence and good humour in the face of a tight schedule. Needless to say, we alone are responsible for the views expressed in our respective chapters.

Robert Lindley
Editor

1

INTRODUCTION

by Robert M. Lindley

The first Leverhulme seminar, entitled 'Higher Education and the Labour Market', began by examining the nature of the manpower demands which many would like to see our institutions of higher education try to meet more effectively. It went on to consider the educational and labour market issues raised if progress is to be made in that direction. Of course, higher education is expected to do much more than provide the economy with skilled manpower, and the part of its resources which should be devoted to pursuing economic objectives is a matter of debate. The placing of labour market questions first on the agenda does not reflect the view that the answers to them should, necessarily, determine policy over the next two decades. It does, though, provide a very useful starting point rooted in economic reality and recognizing that the higher education system and the labour market have developed partly in response to each other. There has been much misunderstanding about the relationship between them and this first seminar was intended to prepare the ground for more detailed discussion of higher education policy and administration at subsequent meetings.

This monograph contains the commissioned papers together with an account of the seminar proceedings, focusing attention on specific policy issues and recommendations which arose out of the papers and the discussion. Although the papers have been revised and edited, no attempt has been made to integrate them or extend their overall coverage to present a comprehensive view of the relationship between higher education and the labour market. The programme as a whole is following a publishing schedule which places a premium upon disseminating the findings of each seminar as rapidly as possible to a much wider audience than will be able to participate in the seminars. The final seminar in the series will then be able to take into account both the work of earlier seminars dealing with specific aspects of higher education and the reactions of a variety of organizations and individuals. It is hoped that the material presented in this monograph will help to inform and stimulate debate. As a guide to the format of the seminar and hence to the relationships between the commissioned papers, brief summaries of the main sessions are given below.

EMPLOYERS' PERCEPTIONS OF DEMAND

This session and the corresponding paper by Professor Laurence Hunter provided a broad view of the whole spectrum of higher education, giving particular attention to the perceptions and requirements articulated by employers during the last two decades of major change. The session dealt with the major actual and potential areas of employment for those educated in institutions of higher education. It reviewed the evidence available on the characteristics sought by employers and the extent to which higher education per se helps to identify those who have them or are capable of developing them. It considered the relevance of existing course structures (content, length, opportunities for part-time study, etc.) from the point of view of the employer wishing to use the higher education system as a source of suitable recruits at various levels and as a means of obtaining supplementary training for existing employees. It reviewed the amount of high-level training undertaken by employers themselves and the way in which this relates or might relate to that offered by the higher education system. The session also covered the responses of employers to difficulties in filling vacancies: for example, the degree of wage flexibility exerted and the scope for substituting people with other types of qualification.

TECHNOLOGICAL MANPOWER

The seminar then turned to focus on a particular sector of the labour market, namely that concerned with highly qualified technological manpower as described by Dr Derek Bosworth in his paper. This session went into some detail about the demand for these skills and provided a corresponding analysis of the potential supply of qualified persons and the operation of the labour market mechanism itself. The session considered likely future developments in the demand for highly qualified technological manpower and, in dealing with matters of policy relating to this group, led into subsequent sessions devoted to higher education policy as a whole.

RESPONSE TO CHANGE IN THE UNITED STATES

Much has been written about the differences in economic and social structures between Britain and the United States. It was obviously beyond the scope of the seminar to assess the relative strengths of particular links between higher education and the labour market in the two countries. Yet it seemed worthwhile to consider, however briefly, the experience of the leading market-orientated economy and education system in the world. Britain's poor economic performance has, after all, been attributed partly to institutional barriers which undermine competition and innovation, and a similar theme has been present in many criticisms of the higher education system. In discussing Professor Richard Freeman's paper, it was possible for the seminar to scrutinize some aspects of the education-employment link in a more competitive system as it experienced the marked change in economic climate which took place during the 1970s.

HIGHER EDUCATION POLICY

Professor Maurice Peston brought the discussion back to the subject of higher education policy in the UK. The fourth session considered policy in the general economic context within which educational expenditure is planned and financed as well as in the light of aspects of labour market behaviour already alluded to in previous sessions. It touched upon the nature and structure of the policy-making process and the question of the accountability of educational institutions and the criteria by which their performance should be judged. The issues surrounding the notion of 'manpower planning' were discussed, including the administrative problems of encouraging the higher education system to respond to the evolving labour market situation.

Revised versions of the papers presented to the four sessions are given in Chapters 2-5. In the final chapter the editor brings together the main issues raised during these sessions and the general session with which the seminar concluded.

2

EMPLOYERS' PERCEPTIONS OF DEMAND

by Laurence C. Hunter

INTRODUCTION

The focus of this chapter is on employers' demands for workers who are educated, generally speaking, to at least first degree level or equivalent. More specifically, its purposes may be defined as follows:

i To show how employer demand for graduates has changed in response to the post-Robbins expansion of graduate output;
ii To appraise available evidence on the degree of satisfaction of employers with the quality and quantity of graduate output;
iii To consider how the supply side of higher education has adapted to needs of employers, both quantitatively and qualitatively;
iv To examine, analytically, problems arising in the matching of graduate supply and demand: including evidence of shortage or over-supply, the expectations of employers of new graduates, and the effects of changing technology on demand;
v To draw overall conclusions.

We begin with a definition of higher education itself. This comprises all the work undertaken in the university sector, plus that undertaken in LEA colleges, polytechnics and voluntary colleges above the standard GCE Advanced level, Ordinary National Certificate or Diploma or equivalent.[1] This definition reflects the presence of a binary system of higher education, in which the roles of the university sector and the LEA or 'public' sector are intended to be distinct and complementary. Although the binary line can be drawn in different ways, as for example with regard to research and to the part-time vocational or sub-degree composition of the student body, differences in financing are perhaps most important. But there is a measure of agreement at the start of the 1980s that the two systems are not carrying out such a distinctive role that the rigid separation of planning and finance is wholly justified.

Both the university and the so-called 'public' sectors have expanded considerably in the seventeen or so years since Robbins, whose guiding principle was that 'all young persons qualified by ability and attainment to pursue a full-time course in higher education should have the opportunity to do so'.[2] This guiding principle formed the accepted basis of policy down to 1980 when the first signs of revocation were becoming visible. While it did not guarantee students a right to a place in a particular course or location of their choice, the development of the system has been largely demand-determined in the sense that the provision of places has responded to broad changes in the pattern of student demand for courses.

It is here, many would argue, that the present difficulties of the higher education system have their origin. For unless we make strong assumptions about the relation between employers' demand for highly qualified manpower and the pattern of course selection by entrants to the system, or unless there is some mechanism — market or otherwise — which ensures some compatibility between these, there is a risk that the market for graduate manpower will experience shortages in some sectors and surpluses elsewhere.

Economists would typically argue that, underlying these processes, there is a recognizable market mechanism which will affect both the supply and demand sides, and hence the longer term adjustment of the market. On the supply side, the basis of the market mechanism is the concept of investment in education (by the individual or family, or by employers or by society) from which a flow of returns over time may be expected. These returns may be appropriately discounted so that the resulting net present value can be compared with that of those not receiving the education or training in question. In this way it is possible to conceive of and — subject to limitations of data — calculate and compare rates of returns on the investment in different forms or stages of education.

The flow of income received by an individual in any occupation may be regarded as broadly reflecting the marginal productivity of his labour. However, this may be subject to modification for a number of reasons, including the effects of market imperfections such as barriers to mobility or deficiencies in information, as well as the short to medium-term variations in relative income which may arise due to excess demand or supply in different occupational markets. Thus an occupation which is subject to a sharp increase in demand, but which cannot immediately increase its supply due to training lags or some form of mobility restriction, will tend to experience a short-term rise in relative income raising the rate of return on investment in education for the occupation, and making it marginally more attractive to new entrants. Without having to assume that workers make occupational choices, including education and training decisions, on the basis of comparing rates of return to the investment, we may argue with some plausibility that changes in relative pay levels *will* influence occupational choice at the margin in such a way as to reduce, if not eliminate, disequilibrium.

We can, therefore, hypothesize a market mechanism which, through alterations in wage and salary offers in different occupations, encourages adjustments in occupational choice and decisions about alternative types or durations of education. Thus the demand for places in educational or training courses will be influenced by changes in the costs : returns ratio of alternative investments. This may be further refined by recognizing that the expected earnings stream in a given occupation may be affected both by the variance in earnings within it and by the probability of it bringing an acceptable job-offer.

On the demand side, recruitment of highly educated manpower will normally be with a view to filling specialist positions, or posts in the management structure. Most of this recruitment will involve hiring manpower which is 'suitably qualified' but short of work experience. As a result there is both a need for additional on-the-job training and a degree of risk in hiring which is made more significant by the relatively high level and cost of such appointments. Recruitment will necessitate a careful selection process, involving a wide canvass of the relevant market (extensive search) and assessment of the suitability and potential of the short list of candidates (intensive search). Qualifications by themselves may be an inadequate guide to suitability and short of actually trying the candidates on the job other evidence of potential may be somewhat indirect.

The exchange of information between demander and supplier thus assumes major importance. On the employer's side, selection criteria may involve the 'screening' of applicants in such a way that — in addition to the basic educational requirements — other characteristics of the applicants will serve as surrogates for attributes likely to be positively correlated with success in the job. These characteristics may include personal factors, such as sex, race, family background, etc., or they may involve aspects of the education process itself such as the school attended, the type of educational institution, the specific college or university, and so on. The significant point in screening is that measures are being introduced which cannot be regarded as objective tests of likely performance in the job but can only stand as proxies for such tests.

One final aspect of recruitment needs to be introduced. In the large corporate organizations which are traditionally employers of highly qualified manpower, recruitment may be confined to a relatively small number of entry points, usually at low levels of the relevant employment structure. The company will provide recruits with suitable training and career development experience within the organization, with internal transfers and promotions providing the means of labour mobility within what becomes effectively a company or *internal labour market*. Except at the entry points, this market will be relatively isolated from external forces, and the structure and level of pay within it may not match those in the external market. This does not mean that its higher grades will be employed on inferior terms and conditions, indeed they are often better. But it does mean that at any particular grade within the structure there may be deviations from external market rates, which may derive from special features of the corporate personnel policy, or from job evaluation schemes, etc. This insulation from the external market may have implications for the ability of the market as a whole to adjust smoothly to changing conditions.

TRENDS IN EMPLOYMENT OF GRADUATE OUTPUT

This section is intended to provide only a basic outline of changes in the level and structure of the higher educational output and its employment. We concentrate on the period from the mid-1960s (when the Robbins expansion began) to the late 1970s, with rather more emphasis on the later years of that period, in which changes in the pattern of sustained growth began to show themselves.

Growth and Distribution of Student Numbers
Table 2.1 shows the increase in full-time and sandwich student numbers in higher education as divided between the university and the public sectors, for selected years between 1966/67 and 1978/79. The total student population increased by nearly 50 per cent, with the university sector growing still faster at 56 per cent for the period. Within that total, the numbers of overseas students more than doubled, while those of postgraduate students rose by about one-third. Over the same period the number of part-time students in higher education, including the Open University, increased from 133,000 to 271,000 (not shown in Table 2.1).[3]

Table 2.1 Total GB higher education
Full-time and sandwich student numbers: selected years
1966/67 - 1978/79 (thousands)

	GB Universities	*GB Public Sector*	*Total*	*Overseas Students* *	*Postgraduates* *
1966/67	184.8	154.4	339.2	24.5	37.0
1971/72	235.0	228.2	463.8	26.8	44.5
1975/76	261.3	243.4	504.7	48.0	49.8
1976/77	271.8	242.7	514.5	54.8	50.3
1977/78	280.5	228.8	509.3	57.6	48.9
1978/79	288.4	218.7	507.1	58.8	49.2

* included in total

Source: DES in evidence to Select Committee on Education, Science and Arts (1980) *Funding and Organization of Courses in Higher Education* House of Commons HC 787-2, Vol. II, p. 5; London: HMSO

We next consider the distribution of the student population by subject area. In Table 2.2, which refers mainly to home students, the full-time undergraduates and postgraduate populations have been aggregated but the universities and public sector are shown separately.[4] Between 1973/74 and 1978/79, the only area actually to show a decline was education. By the early

Table 2.2 Full-time and sandwich undergraduates and postgraduates
University and public sector combined: 1973/74 and 1978/79
By subject area: home students

	1973/74				1978/79			
Subject area	*University undergraduate*	*University postgraduate*	*England & Wales Public **	*Total*	*University undergraduate*	*University postgraduate*	*England & Wales Public **	*Total*
1	902	7 409	11 350	19 661	3 110	6 827	4 630	14 567
2	22 268	1 667	360	24 295	25 988	1 897	550	28 435
3	25 218	3 513	2 260	30 991	27 735	2 829	2 160	32 724
4	3 491	483	100	4 074	4 805	492	130	5 427
5	47 103	7 857	1 100	56 070	50 530	7 467	1 360	59 357
6	41 891	6 243	3 090	51 224	53 583	6 438	4 040	64 061
(of which 6a)	(10 739)	(1 560)	(2 050)	(14 349)	(15 001)	(1 714)	(2 530)	(19 245)
7	3 134	898	1 150	5 128	3 849	978	1 310	6 137
8	24 621	2 187	230	27 038	29 835	1 972	430	32 237
9	18 559	1 942	1 280	21 781	21 740	1 780	2 670	26 190
(of which 9a)	(961)	(284)	(970)	(2 215)	(1 634)	(324)	(1 350)	(3 308)
Totals	*187 187*	*32 199*	*20 930*	*240 316*	*221 175*	*30 680*	*17 280*	*269 135*

* includes overseas students

Subject area code

1	Education
2	Medicine, dentistry and health
3	Engineering and technology
4	Agriculture, forestry and veterinary science
5	Science
6	Social administration and business studies
6a	Business and commerce management studies, accountancy and law
7	Architecture and other professional and vocational subjects
8	Languages, literature and area studies
9	Arts other than languages
9a	Art and design

Source: As for Table 2.1

1970s the prolonged postwar teacher shortage was virtually at an end — though difficulties in mathematics and science still existed — and the slackening of demand for new teachers was reinforced by impending demographic changes.[5] The table also shows a redistribution of education undergraduates between the university and the public sector, no doubt following the graduate training requirement introduced in England and Wales in the early 1970s. All other subject areas showed an increase, but engineering and technology (Group 3) and science (Group 5) experienced a growth rate well below the average, at 5.6 and 5.9 per cent respectively. As a result, science dropped from first to second in the size rankings of subject groups, and engineering and technology only just maintained its rank as third in size.

Graduate Numbers by Subject

Table 2.3 relates only to university graduates over the period 1962/63 to 1978/79, and focuses on four broad subject areas: arts, social science, pure science and applied science. (Graduates in medicine, dentistry and veterinary science are excluded from this table.[6]) Table 2.3(a) relates to first degree output, and shows an expansion of the share of arts and social science graduates from 50.8 to 55.8 per cent of the total. Pure science's share declined from 31.5 to 26.4 per cent while applied science remained constant at just over 17.5 per cent. Overall, of course, the graduating total rose from 23,000 to nearly 61,000, and the proportion of women in the total from 25 to 37 per cent. Note also that women graduates in pure and applied science increased in numbers from 1,700 to 6,100, raising the share of women from 7.4 to 10 per cent. Table 2.3(b) relates to higher degree students. The arts and social studies groups increased their share from 30 to 48 per cent and on the evidence of the most recent period the relative contraction on the science side appears to have been borne primarily by pure science. Within the much smaller totals there was again a marked increase in the number of women graduating with higher degrees in science subjects.

First Destination of Graduates

University students[7] completing first degrees have a variety of options open to them. A considerable number, generally over one-third, will pursue some form of further education or training. A further large group, around 40 to 50 per cent, enter UK employment. The remainder constitute a mixture of small categories, including some who take employment, and others who remain unemployed. These first destinations are the subject of an annual enquiry conducted by each University Careers Advisory Service in the UK. The statistics relate to the first known destination of graduates between the point of graduation and 31 December following the academic session of graduation.

For the present purposes we will confine attention to those entering employment in the UK. Those graduating in medicine, dentistry and veterinary science are excluded, and the remainder are initially classified simply as 'arts-based' or 'science-based'. We consider below the results for 1962/63, 1974/75 and 1978/79.

Table 2.3 Total numbers graduating from universities
By field of study, 1962/63, 1974/75 and 1978/79

a FIRST DEGREES

	Arts	Social Studies	Pure Science	Applied Science	Total
1962/63					
Men	7589		5604	4000	17193
Women	4133		1654	83	5870
Total	11722 (50.8)		7258 (31.5)	4083 (17.7)	23063
1974/75					
Men	5857	9240	10605	8462	34344
Women	7704	4980	4648	523	17855
Total	13651 (26.0)	14220 (27.2)	15253 (29.2)	9165 (17.6)	52199
1978/9					
Men	6753	10801	10874	10007	38408
Women	9723	6748	5228	868	22567
Total	16476 (27.0)	17459 (28.8)	16075 (26.4)	10875 (17.8)	60975

b HIGHER DEGREES

	Arts	Social Studies	Pure Science	Applied Science	Total
1962/63					
Men	607	376	1700	899	2683
Women	143	54	167		364
Total	750 (19.0)	430 (10.9)	2766 (70.1)		3946
1974/75					
Men	2276	2606	4062	3525	12469
Women	1009	687	715	218	2629
Total	3285 (21.8)	3293 (21.8)	4777 (31.6)	3743 (24.8)	15098
1978/79					
Men	2670	3320	4011	3946	13947
Women	1365	1185	935	347	3832
Total	4035 (22.7)	4505 (25.3)	4946 (27.8)	4293 (24.1)	17679

Notes: Graduates in medicine, dentistry and veterinary science are excluded throughout.
Figures in brackets refer to percentages of all graduates in the year.
Graduates of overseas origin are *not* excluded.

Source: *First Destinations of University Graduates*, various years, UGC; London: HMSO

While the proportions entering home employment in 1963 and 1979 are similar, fewer arts-based and more science-based students entered home employment in 1975. Typically, however, it appears that just over one-third of arts-based first degree graduates immediately enter home employment, compared with about one-half of science-based graduates. Table 2.4 provides the detailed results.

Table 2.4 Destination of first degree university graduates of UK origin only: selected years (percentages)

	1962/63		*1974/75*		*1978/79*	
	Arts Based	*Science Based*	*Arts Based*	*Science Based*	*Arts Based*	*Science Based*
Further education or training	47	40	38.9	25.4	29.5	23.4
(of whom teacher training)	(24)	(12)	(18.7)	(8.3)	(11.4)	(5.3)
Gained employment at home in:						
Public service	6	7	10.2	17.7	7.0	5.9
Education	10	7	3.3	2.2	3.2	2.2
Industry	13	32	3.5	23.2	21.1	38.0
Commerce			7.6	6.0		
All other	6	1	4.8	3.3	6.3	2.5
Total employed at home	35	47	29.4	52.4	37.6	48.6

Note: Medicine, dentistry and veterinary science graduates are excluded. Public service employment excludes medicine, dentistry and veterinary science.

Source: As for Table 2.3

Between 1962/63 and 1974/75, arts-based graduates entering industry and commerce declined from 13 to 11 per cent of the total, while science-based students declined from 32 to 29 per cent. The changes in demand for teachers and in graduate training requirements clearly had a significant effect. The proportions entering education employment dropped sharply over this period, as did the proportion of both arts- and science-based graduates entering teacher training. Even allowing for this latter effect, the percentage going on to further education or training declined, especially on the science-based side. There was also a significant increase in the proportion of first degree graduates (excluding those in medicine, dentistry and veterinary science) entering public service.

Comparison of 1974/75 with 1978/79 again shows that the share entering further education or training declined but the arts-based share fell more dramatically. So far as those directly entering employment were concerned, the public sector proportion had once again dropped to its 1963 level, education had remained constant, but the share of industry and commerce rose markedly (from 11 to 21 per cent of the arts-based, and from 29 to 38 per cent of the science-based).

The overall conclusion is that there was a longer-term trend against entry into further education and training, which can largely be explained by the reduced demand for new teachers at all levels of the educational system. The biggest single share was that going to industry and commerce, and this share increased in the latter 1970s. The high share of the public sector in the mid-1970s fell away, no doubt reflecting increasing curbs on public expenditure and public sector staffing.

More detailed evidence is provided in Table 2.5, which includes both first degree and higher degree graduates from universities *and* CNAA first degree graduates from polytechnics in England and Wales.

For university graduates, the declining trend of proportions entering educational employment is clearly shown. Public sector employment of graduates peaked in 1974/75 (when it took over 20 per cent of graduates entering home employment) but declined thereafter to around 13-14 per cent. Industry and commerce are now shown separately, with the share of industry relatively constant around 40 per cent but that of commerce increasing steadily. The 'others' category has also trended upwards.[8]

CNAA graduates, since 1975/76, though much smaller in numbers (7,400 in 1978/79 as compared with 34,000 university graduates), show similar but not identical trends. Most go into industry but the share has dropped from 50 to under 40 per cent in four years. The share of commerce has increased, and that of central government has declined. But against the university graduates' trend, there has been a quite stable share entering local government, and a rising proportion entering education employment, presumably largely as a result of former colleges of education acquiring CNAA degree status.

Types of Work Undertaken in First Employment

Some analysis of the type of work undertaken is now included in *First Destinations of University Graduates*, and we report in Table 2.6 on developments over the period 1974/75 to 1978/79. We look first at the trends over the last five years, for men and women first degree graduates entering home employment. During this period, the number of such graduates rose from 22,386 to 30,139, almost 35 per cent. The biggest single category is personnel, social and medical auxiliary work, a substantial majority of which group is composed of graduates in medicine and dentistry.[9] Rising numbers and shares of the total have been experienced by scientific research, design and development (10.3 to 12.7 per cent), buying, marketing and selling (from 3.7 to 7.0 per cent), management services (1.9 to 8.0 per cent) and financial work (13.6 to 14.9 per cent). Declining numbers were registered by environmental planning, and production operation and maintenance.

Table 2.5 Destination of first and higher degree graduates from UK entering home employment; and of CNAA first degree graduates from polytechnics in England and Wales: selected years (percentages)

UNIVERSITY GRADUATES

	Education	*Central govt.*	*Local govt.*	*Industry*	*Commerce*	*Other*	*Total (000)*
1966/67	17.2	14.7		60.4		7.7	16.6
1973/74	12.8	7.6	12.8	40.0	16.3	10.6	28.9
1974/75	13.9	9.4	12.8	36.5	17.1	10.4	27.3
1975/76	12.6	7.5	9.4	39.4	20.1	11.0	27.5
1976/77	10.9	6.2	7.4	41.5	22.1	11.8	30.6
1977/78	10.2	6.2	8.3	40.6	22.9	11.9	33.1
1978/79	10.2	5.7	7.6	40.6	24.2	11.9	34.0

CNAA FIRST DEGREE GRADUATES

	Education	*Central govt.*	*Local govt.*	*Industry*	*Commerce*	*Other*	*Total (000)*
1975/76	3.3	5.1	16.5 *	50.0	18.8	6.2	4.3
1976/77	8.1	4.2	14.7 *	44.3	20.6	8.1	5.3
1977/78	9.1	4.5	16.5 *	40.3	22.0	7.7	6.2
1978/79	11.1	3.7	16.0 *	38.8	22.7	7.5	7.4

* includes those entering hospital service

Note: Percentage figures in a) differ from those in Table 2.4, both because higher degree graduates are included here, and because the base for percentage calculations is that of graduates entering home employment, rather than of all graduates of known destination.

Source Derived from *Social Trends* (1981) and *First Employment of University Graduates* (1966/67) UGC; London: HMSO

Table 2.6 Work categories of men and women first degree and higher degree graduates of UK universities who entered home employment: 1974/75, 1976/77, and 1978/79 (percentages)

	General management	*Scientific research, design & development*	*Environmental planning*	*Routine scientific analysis*	*Production operation & maint.*	*Buying, marketing & selling*	*Management services*	*Financial work*	*Legal work*	*Information/ advisory & non-scientific research*	*Personnel, social & medical auxiliary*	*Teaching & lecturing*	*All others*	*Total (Nos.)*
FIRST DEGREE														
1974/75	9.3	10.3	7.2	4.1	8.3	3.7	5.9	13.6	3.3	3.4	23.6	4.3	3.0	22386
1976/77	7.8	12.2	4.9	3.4	6.8	6.4	6.6	14.4	3.8	2.7	24.4	2.8	3.9	25866
1978/79	7.5	12.7	5.0	3.4	6.0	7.0	8.0	14.9	3.1	2.7	22.1	3.2	4.3	30139
HIGHER DEGREE														
1974/75	4.0	24.4	5.9	4.2	3.5	1.9	7.2	4.2	0.5	7.5	7.1	28.2	1.4	4925
1976/77	4.8	28.0	4.6	4.3	3.8	2.4	7.3	3.6	0.6	6.7	9.0	23.2	1.7	4714
1978/79	4.9	28.6	5.4	4.3	3.7	2.7	7.2	3.0	0.9	6.9	9.9	20.7	1.8	4723

Source: *First Destination of University Graduates 1978/79*. Tables 15, 18

Among *higher degree* graduates in the same period, total numbers fell from 4,925 in 1974/75 to 4,723 in 1978/79. The two major employment categories are scientific research, design and development which increased its share from 24.4 to 28.6 per cent, and teaching and lecturing which declined from 28.2 to 20.7 per cent.

Of related interest is the distribution across these thirteen categories of graduates taking degrees in different branches of knowledge. To simplify, we concentrate here only on the main types of work categories for each degree area in 1978/79. In education, 82 per cent of first degree graduates entered teaching and lecturing, and 97 per cent of medicine, dentistry and health graduates entered personnel, social and medical auxiliary work. Sixty-five per cent of graduates in architecture and other professional and vocational subjects took up environmental planning work. The remaining main categories are summarized in Table 2.7.[10]

Engineering and technology graduates primarily undertake scientific research, design and development (43 per cent) while another 37 per cent are equally divided between environmental planning and production operation and maintenance. Science graduates are more evenly spread, but almost one quarter perform management services and only a few less enter work involving scientific research design and development. Graduates in social administration and business are concentrated in financial work (35 per cent) but general management, buying, marketing and selling, legal work, and personnel, social and medical auxiliary work each take about 11 per cent. Language, literature and area studies graduates are again well distributed, with buying, marketing and selling ranking first at 19 per cent and general management and financial work close joint seconds at 18 per cent. The smallest group, arts other than languages, has general management top at 16 per cent and personnel, social and medical auxiliary work close behind. Financial work, marketing and information/advisory activities are also significant here.

Unemployment

While unemployment in the labour force as a whole has risen dramatically since the late 1960s, there has until recently been no serious evidence of increasing unemployment among graduates. The annual surveys of the first destinations of university graduates have typically shown an average of 5 or 6 per cent unemployed in December of the year of graduation, subject to some cyclical variation. At least down to 1979, then, the expansion of graduate output appears to have been quite readily absorbed in employment. However, some warning signs are visible. The annual surveys include a category 'gained temporary home employment', covering those graduates who, rather than remain unemployed, take temporary jobs which may or may not bear any relation to their degree qualification. A recent tabulation by the Unit for Manpower Studies in the Department of Employment (reproduced here as Table 2.8) shows that among first degree graduates, the

Table 2.7 Work categories of men and women first degree graduates of UK universities entering home employment. By subject area of degree, 1978/79 (numbers and percentages)

Subject area of degree	*General management*	*Scientific research, design & development*	*Environmental planning*	*Routine scientific analysis*	*Production operation & maint.*	*Buying, marketing & selling*	*Management services*	*Financial work*	*Legal work*	*Information/ advisory & non-scientific research*	*Personnel, social & medical auxiliary*	*Teaching & lecturing*	*Other*	*Total*
Engineering & technology	257 (4.9)	2266 (43.4)	981 (18.8)	169 (3.2)	974 (18.6)	127 (2.4)	236 (4.5)	122 (2.3)	5 (*)	11 (*)	19 (*)	14 (*)	44 (*)	5225 (100)
Science	345 (5.5)	1394 (22.3)	40 (*)	762 (12.2)	321 (5.1)	328 (5.2)	1547 (24.7)	873 (14.0)	15 (*)	111 (1.8)	256 (4.1)	112 (1.8)	152 (2.4)	6256 (100)
Social admin & business studies	844 (11.1)	55 (*)	64 (*)	30 (*)	209 (2.8)	855 (11.3)	374 (4.9)	2710 (25.7)	894 (11.8)	239 (3.1)	854 (11.2)	103 (1.4)	363 (4.8)	7594 (100)
Language, literature & area studies	428 (18.3)	8 (*)	4 (*)	1 (*)	36 (1.5)	452 (19.3)	100 (4.3)	424 (18.1)	16 (*)	206 (8.8)	196 (8.4)	79 (3.4)	387 (16.5)	2337 (100)
Arts other than languages	295 (16.0)	7 (*)	4 (*)	4 (*)	41 (2.2)	215 (11.7)	76 (4.1)	295 (12.6)	20 (1.1)	197 (10.7)	287 (15.6)	85 (4.6)	317 (17.2)	1843 (100)

* less than 1 per cent

Source: As for Table 2.6

proportion still seeking permanent employment has practically doubled since 1970. Engineering graduates have fared best over the period, arts graduates worst. Moreover, a preliminary view for 1980 and 1981 suggests the picture is rapidly worsening. The carryover of job-seekers from 1980 is around 15 per cent, three times the normal, and in 1981 the supply of graduates seeking first employment is estimated to rise by 6 per cent against a depressed demand. Graduate unemployment of 20 per cent or more in 1981 is forecast as quite possible.[11]

Table 2.8 Men and women graduates of GB universities still seeking permanent employment* (percentages)

	1970	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*
Engineering	3.0	7.7	6.0	4.2	3.9	6.7	6.4	6.0	3.7	4.0
Science	6.3	9.2	8.2	8.1	8.7	12.9	12.7	13.1	10.7	10.6
Social Studies	7.1	10.0	8.9	11.0	11.5	13.6	13.3	12.9	11.8	12.4
Arts	6.8	8.4	9.1	11.2	12.0	13.3	14.3	14.8	15.0	16.2
Others	3.3	5.0	5.4	5.8	5.2	6.4	8.9	9.9	7.1	6.5
All	6.0	8.8	8.2	9.0	9.3	11.9	12.2	12.3	10.9	11.3

* That is, 'believed unemployed at December 31', plus 'gained *temporary* home employment'. Based on all home graduates whose whereabouts are known, excluding 'overseas students returned home' and those studying medicine, dentistry and veterinary science.

Source: Calculations by Unit for Manpower Studies (Department of Employment) from UGC First Destination Statistics (Universities' Statistical Record); (reproduced in *Gazette* 88 (11) 1182; Department of Employment

EMPLOYERS' ATTITUDES TO GRADUATE RECRUITS

We consider next the attitude of employers to the increase in the output of graduates. On the quantitative side, attention focuses on the balance of graduates of different disciplines, such as too few doctors or too many civil engineers, relative to demand. Qualitatively, much will depend on employers' expectations of graduates, particularly where graduates are being used to substitute for manpower trained for similar work but not by degree courses. For the most part we focus on the requirements of employers in industry and commerce, where most disquiet has been voiced, but some consideration is also given to reactions in professional occupations.

The 1960s

The 1960s were characterized by the 'swing away from science' which was the subject of the Dainton Report in 1968.[12] By 1960 the proportion of school-leavers specializing in science and mathematics had peaked, and ground was being lost to other subjects. Against a background of rising demand, this was giving rise to anxieties about shortages of vital skills. Thus the 1965 Triennial Manpower Survey of Engineers, Technologists, Scientists and Technical Supporting Staff (1966) observed a deficiency in the present output of qualified engineers, technologists and scientists, both in relation to short-term demand and to longer-term need.[13] The Survey Report saw the major responsibility lying with employers: 'Only employers can define what is required. Unless educational institutions are made fully aware of these requirements they cannot assist efficiently. A great responsibility for the continuous adaptation of our manpower resources therefore rests with management . . . .'[14] Dainton's concern was mainly with the sixth-form choice of subject in higher education, and he pleaded for more breadth and humanity in science courses, improvements in science teaching, the continuation of mathematics education until the end of school and a reconsideration of university entrance requirements to encourage a broader span of sixth-form study. But employers were enjoined to 'recognize their high responsibility for ensuring that careers in science, engineering and technology are satisfying and therefore attractive to young people' (p.95). That this condition was not being fulfilled seems to be confirmed by various studies of the period. Marris (1964) observed that industry was 'failing to captivate the imagination of Oxford students'.[15] Industry was revealing a poor image as a cut-throat business in which rewards in industrial careers were inadequate. And class divisions seemed to be reflected in the predominant choice of students from professional and senior management family backgrounds in favour of professional occupations, whereas those from manual and lower supervisory families were more inclined to go for industrial management.[16] But perhaps the publicity given to imminent shortages and better opportunities resulted in some improvement in the later 1960s. Sanderson (1972) reports a study by David Willings which showed that in periodic surveys of students on their attitudes to different occupations, the preference for industry rose steadily from 9 on a 20 point scale in 1964 to 13 in 1969, and a rise in overall position from sixth to third. Advertising, accountancy and consultancy also increased relatively over the period.[17]

Equally important, however, was industry's attitude to the suitability of graduate output. Overall, there was disquiet about the narrowness and degree of specialization in undergraduate science courses, particularly in view of the rapid changes in technology which were occurring, and the associated obsolescence of knowledge. Only in the research and development area was such specialism really needed, and this was a declining proportion of the scientific labour force at the time. One prominent report argued that too many university departments were based on single disciplines, whereas the real life problems were inter-disciplinary. It also suggested that industry wanted its scientists to have a broader based knowledge of technology, including economic aspects, rather than specialized science.[18] But if industry primarily wanted more generalism, that was true only of science-based courses: on the arts side it wanted a move towards economics and industry-related subjects more relevant to its needs, but only within certain limits. It should not be at the expense of properly trained science and technology graduates, and the fear was voiced that if too many arts and social science graduates were attracted into industry, the result could be that too few science trained managers would emerge, despite the need for them in technologically-based manufacturing companies.[19] However, a study for the Royal institute of Chemistry found that chemical employers had a preference for recruiting specialist chemistry graduates whose training it did not want to see watered down by a broader curriculum.[20] There was also some evidence that employers were uncertain about the value of generalism if this only meant that graduates would have a smattering of subjects like economics and management, rather than an appreciation of their relevance to manufacturing problems.

A further source of complaint related to postgraduate education, especially the PhD, which was seen as irrelevant to most industrial needs except in research and development (and again with chemistry as an exception). PhD training was again too narrow and specialized, and seemed to produce a cultural effect which made industrial employment unattractive. Although this view was not universal, it was widely recognized that some components of postgraduate education needed to be brought more closely into line with industrial needs.[21]

In summary, it is clear that industry at large was concerned in the 1960s both with the numerical and the qualitative adequacy of highly qualified manpower. But the 1960s might in any case be expected to have shown some signs of dissatisfaction as higher education and industry responded to the post-Robbins expansion. We turn next to developments in the 1970s.

The 1970s

As an aid to structuring this discussion, we will adopt a general classification system proposed by Richard Pearson,[22] who identifies three recruitment streams:

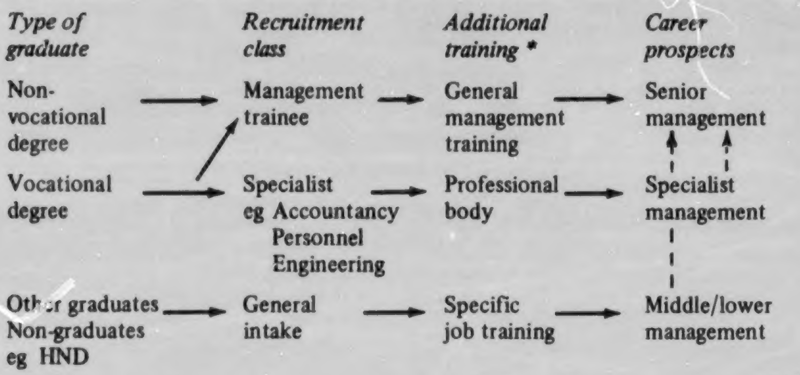
'i The management trainees, who are selected primarily on personal characteristics, are seen as high fliers with potential for senior management and are recruited against the long-term needs of the firm.

ii The specialists, who are recruited for work within specialist functions of the organization such as accountancy, engineering and personnel.

iii The general intake who are recruited as potential junior and middle management. It is to the managerial trainees that the firms direct most attention, selection being based more on personal factors, an

> area in which science-based graduates are thought to be sometimes less proficient, than on academic criteria. Other recruits are seen as often having more limited careers although no formal barriers exist to advancement, promotion being on merit.' (op. cit., p.107)

These conclusions, though based on evidence drawn from the early 1970s, appear to be thoroughly borne out by more recent statements, as we shall see. Following this approach, we can model the recruitment process as below.



Type of graduate	*Recruitment class*	*Additional training **	*Career prospects*
Non-vocational degree	Management trainee	General management training	Senior management
Vocational degree	Specialist eg Accountancy Personnel Engineering	Professional body	Specialist management
Other graduates Non-graduates eg HND	General intake	Specific job training	Middle/lower management

* plus induction in each case

General Management

It follows from this approach that recruits to general management through the graduate trainee route will tend to be drawn from a wide range of disciplines. Some support for this view derives from Table 2.5 above. Although graduates from social, administrative and business studies form the biggest single recruitment source, significant contributions are also made by graduates in engineering, science and the two arts categories. Because of the broad scope of recruitment to general management, quantitative shortages are unlikely to be important, as compared with specialist and vocational positions. But this does not mean that employers will not have criteria for recruitment, nor that they will necessarily be satisfied with the quality of recruits available.

One of the clearest statements on these aspects comes from the Confederation of British Industry (CBI) evidence to the Select Committee which recently examined higher education:

> 'The CBI believes that a few people take existing courses in higher education with adequate regard for their practical application. We are convinced that there should be more regard for courses orientated

> generally towards vocational aims as a basis for the provision of higher education courses in the future . . . . From the point of view of industry and commerce, the total graduate output would be more in line with employment opportunities if some movement in qualitative terms as well as numbers could be encouraged from arts to certain vocationally orientated social sciences and from pure to applied science. Support should continue to be given to the development of business and management studies . . . .'[23]

Thus the CBI take a firm and explicit line on the desirability of more vocational and practical orientation in degree courses, and a shift in the balance of course provision away from arts and pure science to business and management studies and applied science. The CBI were also critical of the development, since the Robbins Report, of the tendency for student demand for courses to shape the system, rather than the likely demand for graduate employment in the economy as a whole. However, they recognized

> '. . . the inherent risks and shortcomings in any attempt to quantify future demand from industry and commerce for highly qualified manpower. The variables inherent in industrial and commercial forecasting of recruitment are much greater than, for example, in teaching or medicine, and corporate planning and related recruitment policies are susceptible to rapid change to meet external economic and trading factors at home or abroad, technological developments and changes in government policies.'[24]

But while detailed manpower forecasting in relation to higher education provision was rejected, more systematic and regular appraisal of demand from all sectors of the economy was desirable as a means of shaping policies and assisting in the optimal allocation of resources. Under such an approach, more use would be made of vocational courses, the dominance of student demand would be modified and the pressure to maintain existing staff and facilities would be reduced.

So far as quality of students and graduate output is concerned, the CBI were somewhat critical of the emphasis on academic, rather than personal qualities in selection for higher (particularly university) education; and it was remarked that 'The complaint which we frequently get from companies is that . . . the people who come out of technological disciplines are all too often less lively as people than those who have done less relevant subjects like the arts.'[25] And again, we would like to see somewhat greater weight attached to the personal qualities, such as motivation, ability for original thought and ability to get at and solve problems. That does not necessarily come out in some of the applicants we get.'[25] Furthermore, the CBI representatives stressed the need not only for people with degrees of immediate relevance, but also for those who, after training, would undertake responsible jobs in general management, accountancy and legal aspects, and 'the historians and classicists who bring with them imagination and lively minds . . . (as) . . . an insurance policy against the unknown.' This again reflects the earlier classification of recruitment.

A good deal has also been made of lack of numeracy in graduates. This criticism relates not to graduates in subjects which are basically dependent on numeracy, but rather to the arts side, who demonstrate an aversion to, or lack of confidence in the handling of numbers. For example:

> 'There is . . . a need for a broadly-based first degree system . . . which produces more physical scientists and engineers and certainly more numerate graduates. The degree of numeracy needed is not, of course, degree level mathematics. Rather it is the confidence and ability to handle numerical data . . . . It is often only the confidence that is lacking.'[27]

While this deficiency is not entirely laid at the door of the universities and colleges, but at least equally attributed to school education, it is argued that there is a vicious circle in which poor school level education in mathematics leads to a shortage of good quality graduates, few of whom will enter school teaching, and so the cycle continues.

We conclude that industrial and commercial employers have found deficiencies, mainly qualitative, in the output of graduates in relation to their perceived needs for generalist management — largely the senior management of the future.

Specialist Management: Engineering

Here we can expect to find more evidence of quantitative dissatisfaction, arising from the more structured definition of demand and the corresponding reduction in flexibility of occupational and job choice by graduates. It is in this area, of course, that the main call for some form of improved manpower forecasting arises, especially given the long lead time required for new students to complete their training. The problem is also made more complex by the fact that some of those taking specialist or vocational qualifications may opt for general management training. Again, the more technical jobs are recruited intensively from the polytechnics as well as from the universities, and we need to consider how employers regard the binary system and relate their recruitment practices to any distinction between the two sectors. This is particularly important in engineering, where there are nearly as many non-university institutions providing degree-level courses as there are universities.[28]

Dealing first with the quantitative problem, we find that there is quite a strong indication of cyclical variation in graduate recruitment and in complaints of shortage. Although the 1970s witnessed a fairly steady increase in graduate output:

> 'Recruitment to industry was sharply restricted during the economic crisis of the middle 1970s and then recovered equally sharply as the consequences of restriction became clear and, at least temporarily, economic prospects improved. Compared to 1977, vacancies for graduates in manufacturing are estimated to have increased by 33 per

> cent in 1978 and by possibly as much as 60 per cent in 1979. This type of swing carries, incidentally, the risk of creating temporary shortages and surpluses .... Opportunity may also account for shifts within the major pattern, such as the continuing increase from the end of the 1960s in the proportion of graduates entering home employment — particularly of engineers and technologists — who were recruited into production work.'[29]

The inherent risk, particularly for structured courses related to vocational or professional jobs, is that there will be a cobweb form of adjustment in which shortages and over-supply will alternate. Excess demand in one year may produce excess supply by the time those responding to shortage emerge from the educational system, and difficulties in job placement or unfulfilled expectations will discourage future flows of new graduates.

Apparent confirmation of the existence of varying degrees of shortage comes from the Standing Conference of Employers of Graduates (SCOEG), in evidence to the Select Committee on Higher Education. SCOEG observed fluctuations in demand, but during the later 1970s in general public sector demand fell and that of industry and commerce increased. Over the period 1974-79 thirty-four major employers in manufacturing varied their vacancies between 3,250 and 3,875, while their recruitment rate varied from 66 to 85 per cent of these vacancy figures, the main shortfall being in engineering disciplines, especially mechanical and electrical, 'with an explosion of demand at a time when supply was slightly falling'. Evidence from SCOEG surveys indicates considerable under-fulfilment of vacancy targets in chemical, electrical, mechanical and production engineering in each of the years 1977-79 inclusive; but much closer balance (and indeed some over-recruitment against target — perhaps due to shortfalls elsewhere?) in chemistry, maths and statistics, and physics.[30]

Additional data pointing in the same direction is quoted in the Finniston Report:

> 'Evidence reported to us from some employers and trade associations suggested that there are insufficient engineers in Britain for current demands and that manufacturing industry faces a chronic and growing shortage of engineers at all levels and for the whole range of engineering disciplines. As example, members of the Electronic Engineering Association said they were suffering a shortfall of at least 10 per cent of engineers overall and were having to decline business opportunities for lack of engineering resource.'[31]

Company-level evidence seemed further to confirm this, and Department of Employment data showed rising vacancies and negligible unemployment among engineers at a time when unemployment elsewhere was rising.

But while this seems fairly conclusive, it is less clear that the deficiencies are purely quantitative. The Finniston Report reserved judgment by observing that 'shortages' were often not of applicants but of acceptable candidates with the requisite qualities, and that the salaries offered were not always commensurate with the calibre of person sought. Part of the shortage problem was attributed to inadequate or incomplete adjustment, by employers among others, to the changing balance of numbers entering engineering through part-time and full-time routes. Again, employers were mainly reporting current needs rather than longer-term corporate requirements.

Attention also needs to be drawn to the earlier evidence and complaints of engineering shortage in the 1960s, and the criticisms of this work on the ground that if such shortages did exist they should be reflected in gradually rising relative pay for engineers — a tendency which did not seem to have existed. However, in the present case, we are not necessarily dealing with an efficient market in which price signals will be accurately adjusted to changing circumstances. Nor are we dealing with a single price or pay level, but rather with a whole spectrum covering the new recruit through to the experienced practitioner. The necessary price adjustment need not be reflected to any significant extent in the average or median salary, if for example it is possible to adjust the starting rate for new recruits in such a way as to exert strong influence on supply.[32]

Given these doubts we cannot dismiss the possibility that employers were simply not offering enough to attract the desired share of the market. Nor, however, can we ignore the possibility that employers were finding the quality of manpower on offer in some way defective — an outcome which could be quite consistent with the SCOEG date on under-fulfilment of recruitment targets. What, then, was the reaction of employers to the quality of graduates?

The Finniston Report again provides a useful starting point:

> 'Engineering education has been the subject of a good deal of critical comment in previous reports and in evidence to us. Complaints continuously voiced, especially by employers, are that the education of engineers is unduly scientific and theoretical; that newly-graduated engineers lack awareness of "real-life" constraints to text book solutions; that they are oriented too much towards research and development work and are not interested in working in production or marketing functions; and that they lack understanding of the factors in the commercial success of their employing organization.'[33]

On the academic side, the Committee of the Engineering Professors Conference (CEPC) agreed that most current first degree courses were not generally well-matched to the requirements of industry. The CEPC standpoint was that the degree courses were in engineering science, including some attention to management and economics, but primarily emphasizing fundamentals so as to provide graduates with the ability later in their training and their careers to tackle real engineering problems in an original and flexible way. It was recognized that graduates did not have experience and skill in the application of fundamentals to real-life problems, nor did they fully appreciate the constraints. This experience and skill had to be developed after graduation.

From the academic side, then, there is a clear expectation of a two-part formation process: a first degree concentrating on fundamentals, followed by a period of further industrial training and working experience. According to Finniston,

> 'It should follow — and in the best companies does — that employers accept responsibility for developing the abilities of newly-recruited engineers and completing their professional formation. Too often this does not happen. . . . Many graduate recruits are "thrown in at the deep end" without further training, almost always in technical jobs where their university experience is notionally relevant, on the principle that "cream will rise to the top". In fact the "cream" is often the first to get frustrated for want of encouragement and opportunities to develop their capabilities.'[34]

In short, it would seem that there is a mismatch between the educational system and the subsequent training and employment system: each perhaps reasonably defensible in its own right but as a general rule not providing the other with a compatible and complementary mate. Nevertheless, some qualifications need to be made to this general conclusion. For example, sandwich courses tend to be well regarded by employers because of the practical experience gained by students during their courses — though the academic complaint exists that placements are volatile as employers respond to cyclical changes in activity.[35] Again, rather different views seem to be expressed on the output of universities and of polytechnics and other colleges offering CNAA degrees. In Benton's recent study of the views of eighty-six representatives of employing organizations visiting both polytechnics and universities in the 'milk-round', distinct differences were reported, with 83 per cent believing that the universities produced better students academically. Different criteria were adopted by the representatives for university and polytechnic students: whereas drive and motivation, and leadership potential featured strongly among criteria for universities, adaptability ranked first for polytechnics followed by drive and motivation, at a level well below that for the university group. Thus different personality characteristics were looked for in the two types of institution. Even more significantly, the criteria for the two types were met much more often in the polytechnics than the universities. The implication is that employers are more demanding of university graduates, perhaps reflecting the pursuit of future senior management rather than an immediate grasp of the practicalities of industrial life.[36]

The fact remains, however, that the university output appears again to leave a sense of disappointment; and this view is sustained through a series of reports on engineering manpower throughout the 1970s.[37] But although these reports are often critical of graduate output, they also generally recognize the failure of industry to provide adequate status for the professional engineer, especially in production areas. In part this was almost certainly due to the shift away from the traditional apprentice route to production engineer towards graduate recruitment — a shift which clearly required adjustment in the expectations of employers and the training programme appropriate to graduate recruits. The evidence is that this adjustment was slow to occur and may even yet be incomplete. The traditional image may also have helped to keep down salaries for production management, making graduate recruitment more difficult — especially when linked with shift-work conditions and the conflicting calls for technical skills and labour management capabilities.[38]

To summarize: the 1970s witnessed a fluctuating increase in demand for vocational specialists in the engineering field, and in certain areas, such as electrical and electronic engineering, excess demand appears to have persisted. But it remains an open question whether there existed a true economic shortage, and certainly the problem was not purely quantitative: the mix of academic and practical skills, together with personal attributes which employers were looking for, was relatively rare at the pay available and inhibited recruitment. The cobweb effect reflecting training lags may also have had some effect in causing peak demands to be underfulfilled, though the effect was blurred by the overall expansion of demand. Nevertheless, there were signs towards the end of the decade that, as alternative employment opportunities contracted, there was a drift back to the applied science and technology subjects, and a corresponding improvement in recruitment performance.

Experience in the Professions

The professions were absorbing numbers of graduates during the 1970s, and we concentrate here on three of these: accountancy, the legal profession and medicine. Educational entry requirements, vocational education and training, and professional ethics are governed by institutes or societies which are representative in some way of the profession at large, and hence of the employers of new entrants. This gives them more direct control over education and training than industrial employers.

Accountancy Although accountancy in the UK is a profession not restricted to graduate entry, it has significantly increased its intake of graduates as a proportion of entrants in the last fifteen years. As a profession it is lacking in unification, its educational and professional standards being governed by six bodies, each with its own history and different areas of primary coverage. This lack of unification has been a matter of some concern to an occupation which has undergone major changes in the content and demands of its work.

One symptom of this concern was the Solomons Report, 1974.[39] Although it does not directly discuss employer requirements, and does not draw attention to any complaints of shortage, this report clearly shows that accountants felt the need for some changes in their professional preparation, within which the role of the university and college sector was of considerable interest.

The differing jurisdictions and rules of the various professional institutes make a brief account difficult, but, in general, professional education is in two parts: an academic element, and a practical element which is effectively a form of apprenticeship. The Scottish profession introduced a compulsory 'academic year' in 1960, requiring full-time university attendance for the first time in the UK, normally in the third year of the apprenticeship. This was followed by a move to wholly graduate entry into the Scottish Institute in 1973/74 with the proviso that holders of the Scottish Higher National Diploma in Accounting would be acceptable. Graduates might be in 'relevant' disciplines — specialized degree courses in accountancy were by now being offered — or if in non-relevant disciplines, a one-year diploma in accountancy (with law and/or economics) would be required. The education stage would then be complete and the practical training phase would begin.

In England and Wales the step to all-graduate entry has not been taken, but the proportion of graduates — relevant and non-relevant — has been increasing steadily. In the 1960s educational requirements at entry were no more than 'O' level, with a period of articled service during which largely private study was undertaken in preparation for professional examinations. In the early 1970s a mandatory foundation course for non-graduates was introduced, two 'A' levels were required for entry, and graduates in non-relevant subjects would take a conversion course giving exemption from the foundation examination.

The Solomons Report observed that the balance between formal education and experience in professional preparation was changing in favour of education. Three different reasons could be advanced for an all-graduate profession: that the skills and knowledge demanded could not be obtained except by a degree programme, that only those who had completed a full degree programme would have the intellectual qualities, judgement and maturity required, and (more pragmatically) that since most talented school-leavers take degrees, the profession must go there to obtain suitable recruits. Solomons stopped (just) short of advocating all graduate entry, recognizing that different students would require different approaches.

Whether degrees should be 'relevant' or not remained a disputed issue. According to Solomons:

> 'Some of the proponents of graduate entry into the accounting profession believe fervently that the subject(s) to be studied to degree level should be anything — literally anything — except accounting . . . it is doubtful whether the hostility experienced by some accountants towards "relevant" degrees is now matched in any other profession . . . .' (op. cit., p.104)

Among the reasons for this view, Solomons mentions the argument that universities should not be providing narrow vocational education but rather broad general education: but this he discounts on the ground that universities have long been involved in professional education, while breadth of education need not mean non-vocational 'liberal arts' courses. Another argument against relevant degrees was that accounting is a practical subject, best learned in practice, not in the classroom. But as Solomons points out, it is not clear why this should hold for accountants when other practical professions, the surgeon for example, combine academic learning with learning on the job. Thus Solomons comes down strongly in favour of at least two years full-time study of a professionally relevant curriculum, and preferably a three-year degree as the normal method of entry. The principle of sandwich courses is applauded, but the practising side of the profession in particular has been cool in its response to, and support of, existing courses — which in any case fell somewhat short of the most desirable combination of academic and practical learning.

The accountancy profession in the seventies was facing up to problems of changing educational requirements, but (in some ways like engineering) was not altogether sure of the purpose of academic study and its relationship to professional practice. The Scottish Institute had pioneered the way, but other bodies were still undecided at the end of the 1970s. Thus the Flint Report[40] of 1980 still found it necessary to restate the challenge to the profession of deciding what education, training and experience were necessary to achieve adequate provision of accounting services, and how that education, training and experience should be organized. Clients using the profession's services had a right to reassurance of the profession's standards, and that implied a unification of effort and of organization which was not yet apparent.

The Law The legal profession displays some characteristics in common with accountancy. During the 1960s and 1970s a variety of reports appeared on education and training reforms, and again there are considerable differences between the Scottish and English systems, covered as they are by different legal arrangements. In addition, there is a professional split between the Bar and the solicitor branches. The supply of legal services in each country was the subject of Royal Commission Reports in 1979 and 1980,[41] including a discussion of legal education, and it is on these that the following account is primarily based.

In *England and Wales* qualifications to practise law may be obtained only by passing final qualifying examinations set and controlled by the governing bodies (the Senate of the Inns of Court and the Bar, and the Law Society). Degrees or diplomas from a university are not in themselves a qualification. Between 1970 and 1978 the number of undergraduates starting a law degree at universities and polytechnics rose by nearly 50 per cent to 4,200. Over the same period the proportion of those entering practice at the Bar who were graduates rose from 64 to 70 per cent, and among newly admitted solicitors the graduate proportion rose from 40 to 60 per cent. Once professional examinations were passed, the next stage of training was vocational: pupillage for the Bar, articles for the solicitor branch. Again, therefore, the problem of satisfactory linkage between academic and practical training as a prelude to full practice was important.

Prior to the Royal Commission Report, the main study of education and training needs was the Ormrod Report of 1971.[42] The main recommendations were that academic and vocational legal education should be integrated as far as possible. Legal education could not be comprehensive of every problem encountered in practice. The Committee found training to be 'haphazard and uncoordinated', and lacking a guarantee of competence and conscientiousness in those responsible. Places as pupils or in articles were often difficult to find and financial support for trainees was often lacking.

Ormrod favoured predominantly but not exclusively an academic training provided by universities and colleges, which would be the normal mode of entry to the profession, to be followed by a year's vocational course and a further period of in-training. The Bar accepted the graduate entry principle but was doubtful about the ability of the academic sector to provide adequate vocational training. The Law Society went less far, mainly on grounds of the financial burden on the profession. But the solicitor branch resisted strongly the proposition that articles should be replaced by vocational training and in-training. Apart from the cost factor and changing economic circumstance, articles were felt to be the best form of professional training, *if properly managed*.

When the Benson Commission reviewed the scene at the end of the 1970s, it did not wholly concur with Ormrod. It found that although shortages of places for intending students in academic institutions had existed in the past, this was no longer true. It dismissed the possibility of imposing a quota on academic places on the ground that 'precise estimates of future needs are notoriously difficult to achieve'. Opinion in the solicitor profession was found to be against the exclusion of non-graduates, or of non-law graduates, from amongst whom might be expected 'a number of potentially promising recruits, whose knowledge of other fields would be valuable in the profession'.

The commission recorded some criticism of the degree of control exercised by the profession over 'approved' degree courses,[43] which was felt to result in some narrowness. But it concluded that there had to be some requirement for instruction in essential topics.

In *Scotland* the present position is one which approximates to all-graduate entry where the degree is a Scottish LLB degree (a 'relevant' degree in the sense used earlier). Ninety-five per cent of all entrants to the solicitor or advocate branches possessed a Scottish LLB, though half the advocate entrants had another degree also. For solicitor entrants this degree curriculum has to meet requirements laid down by the Law Society of Scotland, or, if not, passes must be obtained in the Law Society's own examinations, and a small number still enter the profession by means of these examinations only. Until 1980 this degree course was followed by a two-year apprenticeship, but a one-year postgraduate diploma in legal practice has now been introduced as a compulsory requirement for solicitors. Its aim is to provide training in professional practice and in the vocational aspects and application of certain branches of the law. The diploma is offered only within the five Scottish universities with law faculties. On completion, those who obtain passes in the diploma will enter a two-year training contract with a solicitor.

Intending advocates, on completion of their law degree, are required to take Faculty of Advocates examinations in three specified subjects. (Again, however, provision does exist, though it is rare, for the academic stage to be undertaken wholly by faculty examinations.) This is followed by a period of up to twenty-one months as an apprentice in a solicitor's office, and a further nine months or so 'devilling' with a junior counsel.

Over the 1970s, the annual entry of graduates to the solicitor branch almost doubled, and most of these went to work in the profession. The Scottish Commission found no evidence of serious shortages in numerical terms, except for certain distributional problems affecting legal service provision in remote areas. Towards the end of the decade, however, there was increasing pressure on the availability of apprenticeship places.

As elsewhere, the main problems have been in the relationship between the academic preparation and the professional and practical training. Considerable criticism exists in the narrowness of the LLB degree curriculum, but this is in fact due not to any dogmatism or narrowness of vision on the part of the universities, but rather to the very specific requirements of the Law Society. Understandably, students prefer to obtain the maximum exemption from Law Society examinations, and in doing so generally follow a course which leaves little scope for non-legal subjects. Criticism was also voiced about the failure of degree courses to cover certain branches of the law, notably welfare, EEC, and industrial law. Equally, some 'required' subjects were felt to be unnecessary and irrelevant. But these are, on the whole, complaints from students and recently qualified lawyers rather than from the employers. The main complaint from employers was one of insufficient maturity on the part of three-year degree students, and a lack of a sufficiently broad outlook on graduation. As the commission put it: 'graduates had not learned to think analytically and to draw conclusions, as a good lawyer must'.[44]

Although the commission clearly felt that in part this was due to earlier entrance to the Scottish university system, which led to graduation at a younger age than in England, it also observed criticisms of the method of teaching law, which often depended on rote learning and straightforward lecturing.[45]

In the legal profession, then, there is no obvious sign of quantitative shortage, nor does there appear to be a major criticism by employers of the quality of graduate output. Those criticisms that do exist largely reflect back on the profession's own academic requirements, particularly in Scotland, which narrow the choice of options for most students. As elsewhere, the linking of academic with professional methods and practical experience is somewhat insecure, though the new diploma requirement in Scotland may prove to be helpful in that regard. The apprenticeship itself is perhaps more subject to attack than the academic preparation: although the principle of articles is felt to be right, and conscientious partners do provide excellent training programmes, there is widespread evidence that many firms do not afford these opportunities.

Medicine The number and quality of doctors trained in the UK is obviously a matter of great significance, and it is no surprise that there have been several inquiries into the intake to the profession and the educational preparation required by medical practitioners.

The normal training of a doctor begins with a period of university education, lasting five years, followed by a year of pre-registration training in hospital. Those intending a career in the hospital service will work for about five years as house officer and registrar, and another three or more as senior registrar, before being appointed consultant. Doctors who go into general practice or community health may only spend two or three years in the hospital grades.

Discussion of shortage in the medical profession is bedevilled by two problems. The first is that there is no true concept of market, since to all intents and purposes the NHS is a monopsonist and doctors' terms and conditions are determined by means of a contract — in the consultant's case as an employee of the health authority and in the GP's case as an independent contractor. Pay and conditions are therefore 'administered' and discussion of shortage tends to be in terms of shortfalls compared with some absolute standard, such as the number of doctors per 10,000 population in various countries. The second problem is that, especially in the hospital sector, there are no less than forty-seven clinical specialisms which structure the market and virtually rule out the prospect of substitutability among the specialist branches. Given the long postgraduate education and training period for specialists (twelve to fifteen years), forecasting of future demand and arranging for appropriate numbers to be trained[46] raises serious difficulties, and although there is little evidence of any overall 'shortage' in any meaningful sense, certain less popular specialisms are generally regarded as shortage areas. Likewise on the GP side there are some areas of the country which are 'under-doctored' as compared with national norms.

Attempts have been made in the past to estimate future requirements of doctors, at least to ensure that sufficient training places in universities and hospitals are available, but these efforts have generally been regarded in retrospect as failures,[47] partly due to wrong predictions of the birthrate and of economic growth rates, both of which factors are regarded as influenctial on the demand for doctors. In fact, the number of doctors has doubled since

1949, though the growth rate of the hospital sector has been roughly three times that of GPs. The most recent Royal Commission on the NHS, observing the growth of intake to medical training and perhaps actually aware of past failures, concluded that the planned output of medical graduates was about right, that there was little fear of unemployment among doctors this century, but that more regular reviews of the manpower situation should be undertaken.[48]

The main problems of high-level medical manpower, then, tend to be numerical and distributional. There appears to be little recent comment on the quality of graduate output, which is perhaps not surprising, given the high quality of intake from schools and the control of the professions over the medical curriculum and instruction, much of which is clinical.[49] In this case, the role of the universities is relatively neutral, since the number of places in medical schools is not directly controlled by the individual universities.

Conclusion on the Professions The role of the higher education system in preparing for professional work is quite distinctive, in that the graduate entry-route is not usually the only one though there are signs that it is growing in importance. Professional formation is also distinctive in that it generally recognizes three stages in the process: the academic, the vocational and the build-up of experience. The problem then is quite explicit, that these phases need to be complementary and to be articulated one with another, but at least in accountancy and law there are indications that the ideal solution has not been found. Breadth of academic education, though often seen as a desirable preparation for vocational training, is time consuming and expensive, but the narrow vocational approach often produces a less than satisfactory product. Practical training, too, is commonly criticized in ways which are reminiscent of Finniston's comments on engineering training. Medicine, perhaps for the reasons given above, may suffer less from these problems, but employment in the medical profession is rather different from employment in competitive industry and commerce.

HIGHER EDUCATION'S RESPONSE

In the light of changes in requirements and criticisms which have been made, how has the system responded?

On the available evidence, it seems quite certain that the problem of alleged shortages cannot be attributed to a lack of higher education places, but rather to a lack of take-up of places. This may, however, be significant in another way, namely in regard to complaints about the quality of the output. For the universities, faced with the possibility of empty places as a result of the Dainton swing away from science, often responded by changing entry standards — in some cases by adopting a more flexible approach to the school-level qualifications required for some degree courses. To the extent that this reduced the quality of the intake, or the capability of undergraduates to cope with the work, this might contribute to employer

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complaints about poor quality graduates.

The main criticisms from industrial and commercial employers, as we have seen, relate to the lack of relevance of many degree courses, even in the vocational areas, and to the lack of a practical awareness of real-life problems and of an analytical capacity to solve them. Course content and structures within the higher education system are frequently revised, and it would be hard to argue that the system is stagnant in that respect. Less clear is how far these revisions are informed by the emerging needs of industry as opposed to the perceptions of the teachers about the away their subject is changing and their desire to be seen to be 'up-to-date' in academic — but not necessarily in practical or vocational — terms. In engineering, Finniston observed that several universities and polytechnics had achieved close integration with industry on the industrial part of undergraduate sandwich courses, while a few departments had undertaken a 'radical review' of their traditional courses in collaboration with employers, leading to new courses more closely related to engineering practice. But these developments appear somewhat exceptional.[50] Likewise, favourable reports are found in various quarters regarding the UGC initiative in establishing 'enhanced' courses at ten institutions, designed to prepare able students in engineering for high-flying careers in industry, and involving substantial elements of business and engineering management as well as experience in industry. Other innovations in this area in the 1970s include the Science Research Council Teaching Company Scheme, the SRC Total Technology courses, and support for 'action research in integrated production systems'; but these were all related to postgraduate level and again their numerical impact was slight. The conclusion to which one is driven is that, despite a good deal of activity within the system, including course revision and broadening to include 'business-related' elements such as economics and operational research, the change was not sufficiently widespread or radical to effect the necessary alignment with what industry was providing in the way of post-experience training.

Such a conclusion, at the end of the 1970s, is rather a far cry from the hopes of the mid-1960s, with the establishment of new technological universities and the development of the new polytechnic sector — both of which we might have expected to be particularly alive to the needs of industry. And indeed there were signs in the 1960s that the new breed was anxious to develop in this way, with many of them explicitly attempting to foster links with local industry and contribute to regional economic development.[51]

This too was the period in which the business school development occurred, with new schools being established in London and Manchester (and later in Scotland and the Midlands); while other centres of management education were built up elsewhere, and the polytechnics also extended their commitment with developments such as sandwich courses in business studies. The business school development was the outcome of collaboration between the Foundation for Management Education and the UGC, a prime example of the sort of co-operation which seemed to be required. The enthusiastic response of the universities was regarded by the UGC as an 'outstanding example of the universities' responsiveness to national needs'.[52]

If the expectations of the 1960s were not fulfilled in the 1970s, at least as far as industry was concerned, what went wrong? A variety of explanations may be offered. The sixth-formers' swing away from science led to overcapacity in some courses, as we saw above, and this seemed to reflect the image of industry prevalent at the time. The 1970s saw the beginning of public expenditure economies which became progressively more severe in the later years of the decade, so that new developments and longer-term planning were increasingly difficult. It was easier and cheaper to expand student places in arts-based subjects than in science-based, and the growth of the technological universities was modified: this was made easier by the apparent preference of many students for arts courses, which may again have been influenced by the anti-industry element in student unrest at the close of the 1960s. (Though it should be said that a lot of the arts-based expansion occurred in social science, especially economics, which was not entirely divorced from prospects of industrial employment!) Again, the business school development produced criticisms that the courses provided were too general, were too often based on irrelevant American literature and methods, and did not attract good quality students. Nor did the CNAA courses in management, including sandwich arrangements, seem to fare any better. Graduates in business studies did not fit neatly into the training schemes and employment roles that had been used to cope with the needs of the well-qualified school leavers who had formerly been a primary source of recruitment. Graduates were more expensive, more critical of arrangements, and less easily trained, and this, together with the opinion of many employers that degree learning was irrelevant to their practical problems, no doubt lent further weight to the employer emphasis on personal qualities rather than educational content or form. In their study of employers' reactions the CNAA graduates in business studies, Daniel and Pugh concluded that:

> 'A degree in business studies taken at a polytechnic is often seen as less of an advantage than a degree in a less directly relevant subject taken at an old-established university. Most employers welcome the concept of sandwich courses in business studies, but argue that they would be inclined to consider applicants from CNAA business studies courses more favourably if greater care was taken to ensure that the initial standard of students admitted to the courses was equivalent to that of students entering universities.'[53]

Nevertheless, there were signs from this study that some employers appreciated the opportunity to identify good prospects during placement, and that this was feeding back into recruitment, re-alignment of management training schemes in companies, and, utilimately, a re-valuation of the contribution of such recruits and the advantages of business education generally. Daniel and Pugh wrote, however, that although employers complain of lack of involvement in course planning, even those who co-operate do not take the available opportunities to become involved in the shaping and execution of courses.

Sandwich arrangements have been a significant variant on the traditional block course of study, with an estimated 30 per cent of new engineering graduates coming from such programmes. But universities and colleges offering sandwich courses have found repeated difficulties in securing adequate numbers and quality of placements, particularly during downturns in the economy. The Open University, likewise, has opened new avenues for part-time study, in the course of which it has developed techniques of distance learning. But despite the very considerable numbers involved, it is not clear that the Open University has made any major advances in meeting industry's criticisms of other higher education graduates. Nor have the traditional universities and colleges made any major innovations in learning techniques on the basis of the Open University experience.

Finally, in this review of 'what went wrong', it is worth noting that the hoped-for development of more Master's degree courses, to build on the base of a broad initial degree, was largely frustrated. The 1960s had seen the emergence of the view in industry that 'the PhD training . . . is at best irrelevant to industry and at its worst turns graduates permanently away from industry'.[54] But any really significant expansion of the Master's degree approach was muted by the economies which were intensified during the 1970s.

RECRUITMENT STRATEGIES AND EMPLOYERS' EXPECTATIONS

As graduate output has expanded, both industry and commercial employers, and the professions have increased graduate recruitment. In vocational and professional employment (including engineering) the employer is looking for an educational foundation which is occupationally relevant — though not necessarily as tightly specified as for the Scots lawyer. But elsewhere, and particularly in general management, the relevance of educational preparation per se appears almost irrelevant in some cases. This raises the question why employers in such instances seek to recruit among graduates at all.

In the vocational/professional case, the employer will need to be satisfied as to the appropriateness of the degree education as a base for further training and the build-up of practical know-how. Views on what is 'appropriate' will differ, as we have seen: a few employers still argue for non-relevant or at least broadly based courses rather than for more narrowly prescribed curricula. But given that educational base, the pool of candidates will be bounded by the possession of the desired qualifications, and employers will select from the pool on the basis of personal qualities, academic performance, etc.

In the second case, there is no readily identifiable educational base which defines the limits of recruitment. It would be perfectly feasible for the employer to cast his net widely — to engage in extensive search, as we described it earlier — and to use whatever criteria seem best at predictors for the career opportunity. But this procedure may be expensive and risky. The costs of a comprehensive market search, certainly for generalists, could be considerable, and the risks of recruiting some poor performers might be high. The employer in such circumstances will wish to find means of narrowing the field of search and reducing the risks, and one way is to establish criteria based on academic credentials — even though objectively these credentials may not be necessary for effective performance on the job.

The tendency to adopt this 'credentialist' approach will be enhanced by two factors. First, the increased proportion of qualified school-leavers undertaking degree courses will reduce the chances of recruiting suitable candidates direct from school, and efficiency in the search process will direct attention to the graduate pool. Second, in the large corporate organizations, career and training opportunities will commonly be framed in terms of an internal labour market, with its expectations of continuing employment and progression in the hierarchy. This kind of institutional arrangement, involving costs to the employer in providing training and breadth of experience, will again put a premium on risk avoidance, and credentialism will often be seen as a means of reducing risks.

More generally, what is involved here is no more than the transmission and interpretation of information which is part and parcel of any market. But the labour market raises the information problem in a critical way, both for the employer who has to assess the future productivity of recruits and for the employee who has to estimate his prospects in the firm and the extent to which a given job will satisfy his tastes for work, environment, location, etc. In the case of high-level manpower, these issues will be exaggerated, and the intensive margin of search, both for employer and recruit, will be highly significant. It is this, arguably, which encourages employers to recruit among graduates as a means of screening the relevant section of the market. This screening may be carried to considerable lengths. Thus the pool may be defined not simply in terms of graduates, but of graduates from selected universities or colleges. Oxford and Cambridge are still regarded by many major employers as prime sources of recruitment — presumably because of their high entry requirements or because of the particular educational experience with which Oxbridge colleges are associated. But, as Pearson found in his study,[55] some firms are content to confine their attention to the output of local colleges where a good understanding of the local graduate product exists and economies of search will be available.

In the general case, then, the employer faced with the problem of conducting an efficient search in the absence of well-established vocational requirements, may simply define the selection pool by using a degree (or a class of degree or a degree of a given institution) as a proxy for desirable qualities. From that point on, employers looking for vocational skills or for general ability will have to graft on to the basic education a set of job- and company-related knowledge and skills which will bring the recruit to the point of full efficiency. It is here that many of the problems seem to arise, in the blending of academic knowledge, vocational training and practical expertise.

In the vocationally orientated employments, the choice is between having a closely defined and deliberately structured curriculum and having a greater freedom of choice across the range of subjects which are more or less relevant to vocational needs. The narrow spectrum leads to criticisms of lack of breadth in understanding, the broad approach loses out on uniformity of coverage. Both will require supplementary vocational training, usually at the discretion of the employer, but it needs to be realized that the type of training in the two cases is likely to be radically different — and different also from that which was appropriate in the past when graduate entry was not the norm. So far as the general management trainee is concerned, the screening process such as we have described is in many respects a still coarser means of narrowing the market and again recruits will need additional training before reaching full productivity. Although employers with long experience of working in this market will have a good idea what this training should comprise in their own case, there are many firms which have been encouraged by the availability of graduates (or obliged by the relative lack of intelligent school-leavers from whom they recruited in the past) to recruit from the graduate pool. These newcomers in particular may well have imperfect expectations of what graduates can do and experience uncertainty in arranging appropriate training programmes for them.

There seems no point in attributing blame for these deficiencies either to the higher education sector or the employers. Perhaps the fairest conclusion to draw is that the institutions of higher education and the employers have not got together sufficiently to determine an effective means for carrying the student through a degree course *and* the subsequent training stages. Whether the educational phase of this development should be academic or vocational, or what the balance between them should be in different cases is immaterial for the present purpose. What is important is that there should be a better understanding of what each stage in formation is trying to achieve, and that the various stages should be properly integrated. The evidence would seem to be that over a wide range of employment in the last decade this has not happened.

MARKET MECHANISMS AND SHORTAGES

When excess demand arises in an efficient and competitive market, the normal expectation will be that prices will rise, and supply and demand will adjust until the shortage is eliminated. In the market for highly qualified manpower there is a risk that training lags will persistently cause supply and demand to be out of balance. While this lag may be at the root of the alleged shortage problem in some (primarily engineering) occupations, we cannot say that this is *the* source of the problem, or even the main source. The market, for example, may simply be an inefficient market where signals are not always clear or readily responsive to changes in market circumstances. We will term this a 'sticky' market. Alternatively, the competitive process in the market may be constrained, so that price (pay) is determined less in relation to market circumstances than by reference to some conventional yardsticks used to establish a ruling price — which may deviate from the market clearing price. This we will define as an 'administered' market. A further possibility is that the production system is ill-equipped to meet the requirements of consumers: in the case of goods (eg motor cars) the alternative may be to buy abroad, at least until such time as the domestic production system has been restructured in such a way as to enable it to compete again. This market we will regard as suffering from 'structural' defects.

A little reflection on these market 'models' will reveal that the alleged shortage phenomenon in parts of the graduate manpower market might be explained, in whole or in part, by any of these types of deficiency. A 'sticky' market might reflect inadequate or tardy adjustments of price — particularly relative price or pay in comparison with other employments for the manpower in question. An 'administered' market, in which prices are set with regard to convention rather than market forces, might produce similar distortions of pay. A 'structurally deficient' market might be incapable of producing the type of manpower required by employers and in this case the prospect of resorting to an international market place is likely to be restricted.

Furthermore, on the evidence reviewed above, none of these possibilities could be ruled out as without relevance to the observed problems. For example, there is evidence of cyclically variable recruiting requirements which could easily enough lead to a cobweb model of adjustment. In practice, the true cobweb effect of alternating deficit and surplus has not materialized, because of the secular expansion of demand, but the significance of training lags cannot be ruled out. The main point of decision about courses within higher education (and to some extent about likely careers) is during fifth and sixth forms at school. The considerable network of careers advisers at schools clearly has a close interest in changing employment opportunities and prospects and may be influential at the margin in steering higher education entrants into the most promising areas. But of course an expanded output of graduates may arrive on the labour market when the opportunities have diminished; and on the 'once bitten, twice shy' argument, advisers may be reluctant to guide their pupils into areas regarded as risky.

Again, as we have seen, even relatively specialized degree courses — in engineering, for example — may act as means of entry to a wide range of industries and functions.[56] It is perhaps at this point, close to graduation, that the alternatives are re-assessed. Employment opportunity will obviously be a significant factor, but so will pay and career characteristics.[57] If so, the distortion of market signals or their lack of relation to imbalance may result in the market mechanism acting sluggishly to restore equilibrium.

We have also encountered evidence which suggests that the output of the higher education system does not match up to the expectations of employers, which may mean that the system is not producing the particular combination of characteristics required, or that those who have such characteristics are being diverted or attracted elsewhere.

To try to unravel the real source of the unsatisfied demand problem, or to put the various influences in some order of priority, is a major task requiring research beyond the scope of this chapter. On a casual basis, some judgements may be offered, though the conclusions must be treated with considerable caution. At first sight, the market for new graduates appears to be a strongly competitive market in structural terms. The main employers are well represented in the annual milk-round of universities and colleges, while at local level employers have ready access to local student populations for recruitment purposes. There is considerable investment by employers in acquiring relevant information, and this is supported by the year-round efforts of careers advice and appointments services, which should ensure that graduating students have access to up-to-date conditions and opportunities. Indeed, recent evidence indicates that university careers offices improved their standing over the 1970s as valuable sources of information for evaluating career opportunities, heading the list of available sources.[58] Thus, information both on demand and supply sides is widely available, the extent of the market is quite well defined, and opportunities exist for demand and supply to be brought together.

This basically competitive structure does not, however, seem to have brought about an efficient clearing of the market in which both demand and supply are satisfied. The evidence reviewed above suggests that the market does adjust, in the desired directions, but rather sluggishly and imperfectly. The inherent lags in training and professional formation to the point of first employment must be influential in this regard. But the tendency of many employers to vary graduate recruitment in line with short-term economic conditions rather than adopt a steady hiring strategy against long-term requirements must surely be a contributory element, which adds not only to volatility of demand but to the uncertainties faced by entrants to higher education and to their advisers. There are indications that once expectations of employment in an occupation have been frustrated by a short-run dip in demand, confidence returns only slowly, especially when alternative opportunities are available.

A further factor which may help explain the imperfect working of the market is the structural composition. Although we have used the concept of a market for highly qualified manpower, both supply and demand are evidently far from homogeneous, with the result that substitution and mobility among compartments are difficult to achieve, especially in the specialist sectors of the market. The professional segments, it is true, appear to have fared better than industry in securing an adequate supply, though even there qualitative problems are not absent. But the professions have the advantage of greater control over entry and standards in the interests of the profession as a whole, and pay levels at entry may be set more competitively compared with those offered within the internal labour markets of the large corporate organizations in industry and commerce. This is not to say that relative pay adjustments do not take place elsewhere in the market. It is reported[59] that Leeds University's index of graduates' median starting salaries shows that applied scientists lost ground compared with arts and social studies graduates between 1965 and 1972. Since then, however, applied scientists (and to a lesser extent pure science graduates) have recovered lost ground and made further gains down to 1979. The same source argues that the influence of pay tends to operate through comparison of salaries at the entry gate, rather than over the later career. This would seem to conform with earlier evidence[60] that adjustments in starting salaries are influential in reallocating professional labour. But despite this evidence of pay moving broadly in the market clearing direction, it is by no means certain that employers have used adjustments in relative starting pay as actively as a truly competitive market would require.

Finally, account must be taken of the persistent signs of incompatibility between the output of the system and the requirements of employers, which suggest a malfunction of the market in defining the qualities of the services traded within it. Although it is difficult to blame either side of the market for this, it seems clear that one or both will have to change if the market's operation is to be improved. Within the vocational sector particularly, either the universities and colleges producing the output will have to bring their product into line with employer requirements, or employers will have to adjust their expectations *and* their further training programmes to make best use of the graduate recruits. That these changes should have been slow to occur may be ascribed to two factors. First, resort by employers to screening and credentialism may help to obscure the real character of the demand requirements — perhaps to some extent to the employers themselves! Second, there is the changing technological situation. The demand for graduates has grown both in the declining employment base of manufacturing and in the expanding service sector, and within these sectors the industrial distribution of graduate intake has changed, as well as the occupational distribution and the disciplinary areas from which recruitment occurs. In response to rapid economic changes, such as the rise in energy prices, and technological innovations such as the breakthrough in micro-electronic applications, employers may well have opted for a larger graduate recruitment without having a clear idea of their use — rather in the spirit of insurance against an uncertain future.

We have to conclude, then, that although the market exhibits some signs of competitiveness, the compartmented nature of the market, and behaviour within it, result in rather imperfect adjustment processes, and these imperfections would seem to underlie many of the criticisms and complaints observed earlier in the discussion.

FUTURE DEVELOPMENT

In the post-Robbins period, the size of the market for highly educated manpower has expanded considerably, on both the vocational-professional side and on the non-vocational side. Reference to Table 2.2 suggests that roughly 40 per cent of full-time students are in vocational-professional areas of study.[61] The questions then arise, how much further can the vocational components of the market expand, and what are the prospects for the non-vocational sectors? In the first case, there are perhaps some signs that vocational areas such as teaching, law and accountancy are reaching saturation point, though there is still scope in the latter two areas for expansion of graduate intake in total recruitment. However, in some ways the vocational sector is less problematical compared with the non-vocational where credentialism seems likely to provide the rationale for an increasing proportion of demand. Three questions have to be asked here: is credentialism in this respect necessarily bad, given that it *may* result in greater flexibility of outlook in management in the longer term; how much further is this likely to extend; and is it reasonable or just that society should bear the main costs of screening?

Underlying these questions is a more fundamental issue still, namely the function of the higher education system as a whole. Again on the vocational side there are fewer problems on this score, but there is a clear implication in much of the evidence reviewed earlier (for example from the CBI, p.20 above) that the higher education system exists — or should exist — to provide the nation's needs for high level manpower. There can be no doubt that this is one of its functions, but is it the only function, or should the balance be moved substantially towards the vocational side? During the 1970s, government policy derived from the 1972 White Paper which stated that:

> 'Opportunities for higher education are not however to be determined primarily by reference to broad estimates of the country's need for highly qualified people; although attempts to relate supply to likely demand in certain specialised professions — and, particularly, at the post-graduate state — will be no less than before.'[62]

This so-called 'Thatcher principle' would leave the shape of the higher education system largely to student preference informed by adequate knowledge of employment prospects. The changed economic conditions of the 1980s may put increasing pressure on that principle but it is perhaps unlikely that any attempt will be made to move the system very far in a purely instrumental direction.

Improving the Operation of the Market

On the assumption that some change in orientation may occur, but that it will not involve a radical shift, there remains the question how the operation of the market can be improved. The analysis above would suggest that any such improvement must involve both the higher education system and the approach of employers to recruitment from this pool and to the subsequent training of graduates. We have argued that there is a distinct gap between the objectives of the higher education system and the expectations of employers, which is most pronounced in the vocational sectors of the market. The choice would seem to lie between a narrower view of vocational education, which would require a realignment of vocational degree courses, and a continuation of relatively broad vocational courses which are designed for a longer-term flexibility on the part of the graduate but which would require serious rethinking by employers about the best way to graft on an appropriate practical training.

Such realignment would not in itself be sufficient, however. The inevitable lags in the supply of new graduate recruits to any occupation enhance the importance of better information on occupational prospects and a clearer definition by industrial and commercial employers of their long-term requirements for graduates, which should lead to a steadier rate of recruitment and reduction in the cyclical variation of graduate intake. But while this is evidently desirable it is much less clear that it can be achieved. The underlying difficulty exists in the hazards of demand forecasting in this sector of the labour market. Without entering into the discussion in any detail, we may note that the almost unanimous verdict of a range of experts appears to be unfavourable to any form of precise forecast and related planning arrangements.[63] If this view is accepted — and the arguments are strong — it reduces the likelihood of real improvement in the market as a result of interventionist policies. The choice then is directed back towards reliance on market processes. But where and how can these be influenced?

So long as the general shape of the higher education system is determined by student preference, the greatest need will be for up-to-date and accurate information to be available to senior school pupils at the point of decision on 'A' level or equivalent courses (and to their advisers at this stage); and again to students at the point of entry to the higher education system (and their advisers again). There is surely a case here for an authoritative and properly researched annual statement of current trends in various sectors as an aid to decision making, though clearly it would be necessary to watch carefully the effects of such an analysis in case it should lead to overcrowding in some sectors and a dearth elsewhere.

In an efficient market one would also expect to find a sensitive price mechanism which would play a major role in allocation and re-allocation of resources. Although the evidence on this is far from satisfactory, the indications are that starting salaries in the market as a whole are not used as actively as they might be by employers. The prevalence of internal labour markets in the private corporate sector may, as we have argued, be partially responsible for this, but other factors should not be discounted. What, for example, is the role played by the public sector? And how far have the starting pay levels in the 1970s been influenced by successive phases of incomes policy? Have increased levels of unionization in lower and middle management had any effect on the level or the flexibility of initial salaries?

In general, then, the informational apparatus of the market, particularly in its relation to key points in the decision process regarding courses and career orientation, deserves greater attention. And related to that, the use and effectiveness of signals in the market, including that of pay, might usefully be reviewed by those who operate them.

Government Policy

Two essential questions may be posed in terms of the allocation and distribution of resources in higher education. The allocation question relates to the proper level of central government support for higher education, in terms of public expenditure. The distribution question concerns the best means of deploying that expenditure within the system, particularly with regard to subject balance and to the objectives and functions envisaged on each side of the binary line.

On the allocation side, two indicators may be of particular importance. First, government must surely look closely at the implications of the recent rise in unemployment. Is this an indication of saturation in some sectors of the market? Or is it simply a belated reflection of the rising unemployment trend in the national labour market over the 1970s, exaggerated by the depth of the 1980/81 recession? Against the background of public expenditure economies, government would no doubt welcome confirmation of the saturation hypothesis which would give it a freer hand in imposing still heavier cuts on the higher education sector. But the risk is that if the surplus is temporary, cutback will lead to shortages later in the 1980s. Further difficulties in pursuing such a course arise in relation to distribution, to which we return shortly.

The second indication available to the government is from consideration of the social rates of return available on higher education. Recent estimates of average rates of return suggest that they lie above the Treasury test discount rate, though from this point of view evidence on marginal rates of return would be more appropriate. Perhaps more significantly, the rates of return appear to be particularly sensitive to changes in the level of student grant, which would suggest that this is an important policy variable (even though private rates of return would normally be the critical factor influencing student choice).

On the distributional side, the problems are still more formidable. If a more dirigiste policy is ruled out, as it surely must be, assuming the verdict on detailed demand forecasting is upheld, the alternatives lie between some attempt to provide a general guide to the development and balance of the higher educational system and assistance in creating conditions for more assured reliance on market processes. But there is at present no clear mechanism by which government can either determine where selective cuts or redistributions should be made in the longer-term interests of the economy or give direct effect to any such selective pruning. The government also faces the difficulty that any attempt to steer the system in the direction of narrower and more explicit vocationalism would tend to result in still greater compartmentalization of the market. Existing tendencies to simultaneous unemployment and surplus in different sectors would be exaggerated. Nor is it clear that such a shift in balance would be in the best interests of an economy which needs to be flexible in response to changing technology and shifting patterns of world trade, in which Britain's comparative advantage may lie in high human capital products and services. The implication of this would thus seem to be that government's priority should be that of assisting in improvement of market processes. In what way that might best be achieved is left open for discussion.

Finally, in this connection, government may find it more difficult to reshape industrial thinking on graduate employment than to assist in the rethinking of objectives and relations with the employment market which the institutions of higher education must face up to. While we should not ignore the question whether government *can* do anything in respect of employers in industry and commerce, the more likely areas for reappraisal may lie in the structure of the higher education sector, including the relevance of the binary system. Perhaps above all, it needs to be stressed that sensible provision for the future needs to be made with a view to the changing needs of society, not simply those of the economy, and from a starting point which offers scope for reasonably stable planning against these longer-term needs — in sharp contrast to the highly unstable and ad hoc basis which has prevailed in recent years.

NOTES

1 Education, Science and Arts Committee (1980) *The Funding and Organization of Courses in Higher Education* Vol. I, p.1vi, HC 787-1m; London: HMSO.

For a fuller discussion of the definition problems, see Williams, Gareth (1981) *The Main Policy Issues Facing Institutions of Higher Education in Britain in the 1980s and 1990s* (mimeo).

2 Committee on Higher Education (1963) *Report* Cmnd 2154, p.49; London: HMSO.

3 Department of Education and Science, Memorandum to Education, Science and Arts Committee (1980) *Op. cit.* Vol. II, p.6.

4 In fact these figures exclude public sector students in Scotland but this should make little difference to the conclusions.

5 For further discussion, see Thomas, Barry and Deaton, David (1977) *Labour Shortage and Economic Analysis* Chapter 4; Oxford: Basil

Blackwell.

6 Over the same period the number of medical and dental graduates in Great Britain rose from about 2,000 per annum to almost 3,500, and the proportion of women graduates rose significantly.

7 For CNAA graduates, see pp.12-13.

8 This category includes creative and entertainment work, journalistic and other writing or editorial work, copywriters, actors and musicians, broadcasting, secretarial and clerical work. These are generally regarded as employments that will tend to increase with rising living standards, so the probability is that we are observing a real phenomenon in this trend rather than a purely statistical 'rag-bag' effect.

9 In this oddly-assorted grouping, the use of 'medical auxiliary' is quite misleading, since it clearly includes medical and dentistry graduates.

10 It is instructive also to read this table by columns as a means of identifying the subject areas from which different business functions recruit most of their graduates: here of course only the numbers and not the percentages shown in the table are relevant.

11 For further discussion, see Scott, Neil (1981) Graduate supply and demand in 1981, *Employment Gazette* February, pp.69-75; Williamson, Peter (1981) Flow of new graduates into employment, *Employment Gazette* February, pp.71-75; and Burns, Tim (1980) Science and arts: the job gap widens, *Employment Gazette* November, pp.1182-1184.

12 *Enquiry into the Flow of Candidates in Science and Technology into Higher Education* (1968) Cmnd 3541; London: HMSO.

13 Committee on Manpower Resources for Science and Technology (1966) *Report on the 1965 Triennial Manpower Survey* Cmnd 3103, p.37; London: HMSO.

14 *ibid.* p.31.

15 Marris, P. (1964) *The Experience of Higher Education* p.159; London.

16 Hutchings, Donald (1967) *The Science Undergraduate: A Study of Science Students at Five English Universities* Oxford.

17 Sanderson, M. (1972) *The Universities and British Industry* p.383; London: Routledge and Kegan Paul.

18 Industry, Science and the Universities (1970) *Report of a Working Party on Universities and Industrial Research to the Universities and Industry Joint Committee* London: Confederation of British Industry.

19 *Graduate Training in Manufacturing Technology* (1970) London: HMSO.

20 Royal Institute of Chemistry (1970) *Report of a Committee of Enquiry into the Relationship between University Courses in Chemistry and the Needs of Industry* London.

21 *The Flow into Employment of Scientists, Engineers and Technologists* (1968) Cmnd 3760; London: HMSO.

22 Pearson, R. (1976) *Qualified Manpower in Employment* Sussex: Institute of Manpower Studies.

23 Confederation of British Industry, memorandum of evidence to the Education, Science and Arts Committee (1980) *Op. cit.* Vol. II, p.329.

24 *ibid.* p.330

25 *ibid.* p.338; Mr M.D. Bury in oral evidence.

26 *ibid.* p.337; Dr K.B. Everard in oral evidence.

27 Association of Graduate Careers Advisory Services, memorandum to Education, Science and Arts Committee (1980) *Op. cit.* Vol. II, p.465.

28 But the CNAA graduate output is only about one-third of the total.

29 Fogarty, Michael P. and Reid, Eileen (1980) *Differentials for Managers and Skilled Manual Workers in the United Kingdom* p.31; London: Policy Studies Institute/British North American Research Association.

30 For further detail, see SCOEG, memorandum to the Education, Science and Arts Committee (1980) *Op. cit.* Vol. II, pp.448-53.

31 *Engineering our Future* (1980) Report of the Committee of Inquiry into the Engineering Profession, Cmnd 7794, p.52; London: HMSO.

32 We will return to the question of 'the market' for qualified manpower later. We might also note that in terms of the rate of return to educational investments a given change in starting or early-career rates of pay will tend to have a more significant effect then than at the later career stage.

33 *Engineering our Future* (1980) *Op. cit.* p.83.

34 *ibid.* p.85.

35 Education, Science and Arts Committee (1980) *Op. cit.* Vol. II, pp.350-1.

36 For further details, see Benton, D., Some implications of the binary system for graduate employment. Memorandum to Education, Science and the Arts Committee (1980) *Op. cit.* Vol. II, p.480-2.

37 See, for example, *Frontline Management* (1976) Report of BIM Working Party, London: BIM; *Graduates in Engineering* (1977) Engineering Employers' Federation Working Party Report, London: EEF; *Career Development of the Production Manager in British Industry* (1979) Occasional Paper New Series OPN 17, London: BIM Foundation.

38 cf. *Career Development of the Production Manager* (1979) *Op. cit.* p.30.

39 Solomons, David with Berridge, T.M. (1974) *Prospectus for a Profession: the Report of the Long Range Enquiry into Education and Training for the Accountancy Profession* London: Advisory Board of Accountancy Education.

40 Flint, David (1980) *The Impact of Change on the Accountancy Profession: a Report to the Council of the Institute of Chartered Accountants of Scotland.*

41 The Royal Commission on Legal Services (1979) *Final Report* Cmnd 7648; London: HMSO. Also the Royal Commission on Legal Services in Scotland (1980) *Report* Cmnd 7846; London: HMSO.

42 *Legal Education in England and Wales* (1971) Cmnd 4595; London: HMSO.

43 There were eighty such cases in all, including three modular degrees and seven part-time.

44 Royal Commission on Legal Services in Scotland (1980) *Op. cit.* Vol. 1, p.247.

45 *ibid.* Vol. 1, p.247.

46 New consultant posts and senior registrar posts are regulated by central machinery.

47 Committee to Consider the Future Numbers of Medical Practitioners and the Appropriate Intake of Medical Students (1957) *Report* London: HMSO. Also Royal Commission on Medical Education (1968) *Report* Cmnd 3569; London: HMSO.

48 Royal Commission on the NHS (1979) *Report* Cmnd 7615, pp.211-2; London: HMSO.

49 However, the Todd Report (1968) recommended that all medical students should receive teaching in social and behavioural sciences, and although most medical schools now include this in their curriculum, it tends to play a minor part attracting little enthusiasm or priority. See also the latest proposals for a new medical career structure, which would have implications for post-registration training: Royal Commission on the NHS (1979) *Op. cit. Report*, Appendix I.

50 *Engineering our Future* (1980) *Op. cit.* p.87.

51 For an excellent short account of what was achieved, see Sanderson, Michael (1972) *The Universities and British Industry 1850-1970* Chapter 13; London: Routledge and Kegan Paul.

52 University Grants Committee (1968) *University Development, Report for the Years 1962-67* London: HMSO.

53 Daniel, W.W. and Pugh, H. (1975) *Sandwich Courses in Higher Education* Broadsheet No. 557, p.69; London: PEP.

54 *The Flow into Employment of Scientists, Engineers and Technologists* (1968) p.61; London: HMSO. This view was not however shared by the chemical industry, which seemed to find the numbers and relevance to industrial application quite reasonable: cf. Royal Institute of Chemistry (1970) *Report of Committee of Inquiry into the Relationship between University Courses in Chemistry and the Needs of Industry* London.

55 Pearson, R. (1976) *Op. cit.* pp.50-2.

56 cf. Table 2.7.

57 MORI surveys of graduates over the years suggest that money is not at the top of graduates' priority lists but is nevertheless important, and there is a slight indication that it may be increasing in importance. See Career attitudes of final year undergraduates (1980) *Department of Employment Gazette* January.

58 *ibid.* p.15.

59 Fogarty and Reid (1980) *Op. cit.* p.33. The Finnison Report also confirms this tendency for young engineers' rewards to improve.

60 *Wages and Labour Mobility* (1965) pp.126-131; Paris: OECD.

61 This is inevitably a crude division, but fairly clear evidence of vocational orientation exists in subject areas 1, 2, 3, 4, 6a, 7 and 9a of Table 2.2.

62 Secretary of State for Education and Science (1972) *Education: a Framework for Expansion* Cmnd 4174, para.117; London: HMSO.

63 This issue is much discussed in the evidence taken before the Education, Science and Arts Committee (*Op. cit.*): see for example the memoranda submitted by the Association of Principals of Colleges (vol. II, pp.99ff), the CBI (*ibid.* pp.342-3), The Association of Graduate Careers Advisory Services (*ibid.* pp.463ff), Dr R.M. Lindley (*ibid.* pp.454ff); and Professor G.L. Williams and Oliver Fulton (*ibid.* pp.443ff). See especially the latter for detailed arguments.

3

TECHNOLOGICAL MANPOWER

by Derek L. Bosworth

This chapter attempts to provide an overview of the operations of the labour market for highly qualified technological manpower (HQTM) and, in particular, of the links between this market and the education system. More space has been devoted in the economics literature to HQTM than perhaps to any other group. The reason for this is not too difficult to establish, as they are seen by many commentators to be the lynchpin of Britain's industrial prosperity. They have also been the subject of a considerable number of government reports, although many of the findings and recommendations concerning educational reforms have been ignored by the respective governments of the day (Finniston 1980, p.4; THES 1981).

HQTM comprise individuals with degree or 'equivalent' qualifications in science, engineering or technology. The term 'equivalent' is taken to mean that the individual possesses an equivalent professional qualification and is, therefore, a member of an appropriate professional institute. Care must be exercised in distinguishing HQTM, a group defined by their educational characteristics, from the occupational group of professional scientists, engineers and technologists (which we will call SET occupations). While the two groups overlap they are not identical: HQTM are often employed in other than SET occupations and those employed in SET occupations may not possess degree or equivalent qualifications in SET subjects. It will become apparent in due course that this feature complicates analysis of this labour market.

The notion of a labour market has already been introduced at the beginning of Chapter 2 where a brief description was given of the various factors likely to influence the demand for and supply of different skills and the kind of market mechanism by which they may be brought into balance. Here we begin our survey of the labour market for HQTM by reviewing the factors which underline the demand for HQTM. The chapter then investigates the stocks of HQTM (and competing manpower) from which supplies of labour are drawn for SET occupations. Attention then turns to the market outcome and special consideration is given to how well the market operates from both the employers' and the employees' points of view. The final section attempts to draw the more important threads of the discussion together, as well as highlighting the main policy issues.

ASPECTS OF DEMAND

Private Demands

There is a wealth of theoretical and empirical work of relevance to an understanding of the demand for HQTM (Bosworth 1976). A great deal of the evidence arises as an unintended spin-off from research into other areas (eg the structure/conduct/performance debate of industrial economics). Of the alternatives, 'employment functions' (which relate the demand for particular types of manpower to the level of economic activity and to the relative prices of different factors of production — including different skills) appear to be the most promising. A major problem, however, is that traditional models of this type relate the current demand for labour to current output and factor prices (for an example in the area of HQTM, see Buxton 1977). While current production activity is an important influence on the demand for HQTM, this type of labour is involved in a variety of other functions, many of which yield their return to the firm only over long periods of time (eg research and development, R&D). Thus, the demand for HQTM should also be related to the levels of activity in these dynamic functions (Bosworth and Wilson 1977 and 1978; Buxton 1978; Bosworth 1981).

While an approach through the various functional activities seems most promising on theoretical grounds, this still leaves important practical problems to be resolved, not least of which is unearthing sufficient data to test alternative models of demand. The first two columns of Table 3.1 relate to members of institutes representing professional scientists. The data indicate the importance of the research, design and development (RD&D) function in addition to the categories of education and training (which is mainly outside the domain of private firms) and 'other scientific' (which includes production activities). Analogous information from the institutes of professional engineers, shown by the second group of columns in the table, indicates that 'other engineering' (again closely related to direct production activites) is most important. 'General management and technical administration' (which is associated with employment outside the SET category) also ranks highly. Comparison of scientists with engineers reveals substantial differences in the levels and changes in importance of the various functions.

Sufficient data are not available to develop separate models of demand for each function. Thus, the research findings available relate the overall level of demand to the level of activity in each of the functional areas and to relative factor prices. The functional areas explicitly distinguished in the empirical work are production, R&D, investment and marketing/technical assistance for buyers. Managerial functions were implicitly assumed to be related to the overall level of activity in the other functions. The first of the functional areas links the model with the traditional literature on employment functions, the remaining variables are the result of incorporating the firms' dynamic demands for HQTM. Detailed results are to be found in Bosworth 1981. The levels of activity in each of the four functions are of considerable importance in explaining the demand for HQTM. The results indicate that the demand for HQTM is most responsive to variations in the level of R&D and, then, in order of responsiveness: production, new investment and marketing assistance.

Table 3.1 Distribution of employment of HQTM by functional area*

	Scientists		*Engineers*			
Nature of work	*1968*	*1971*	*1968*	*1971*	*1975*	*1979*
General management and technical administration	9.3	8.4	26.4	29.3	30.8	29.7
Research, design and development	36.4	41.0	29.8	30.1	26.8	23.4
Education and training	24.9	24.7	7.5	7.8	7.1	5.8
Other scientific/engineering	27.8	22.6	32.1	30.9	32.4	39.5
Non-scientific/non-engineering	1.6	3.3	4.1	1.9	2.9	1.6

* Column percentages sum to 100 subject to rounding

Source: DTI surveys of professional scientists, 1968 and 1971. CEI surveys of professional engineers, 1966-79.

As a basis for understanding how the market position of HQTM has been changing (and as an underpinning for some of the later policy discussion), Table 3.2 summarizes the main trends influencing the level of activity in the main functional areas. The trends clearly show that, without exception, any growth that the key variables exhibited prior to the mid- to late 1960s was largely exhausted and absent from the 1970s. The R&D of private companies, for example, exhibited a three-fold growth from 1954 to 1967 in real terms, followed by almost zero growth from then on. This is a particularly important trend because of the sensitivity of HQTM employment to R&D activity. The overall level of production in the economy, shown by GDP(1), shows a very similar sort of pattern, although it has grown more steadily than R&D throughout the period. Manufacturers output, represented by GDP(2), levelled off more acutely in the 1970s. The initial upward trend in investment lies between those of R&D and production, but it turns down somewhat later in the period. Trademark activity is used as a proxy for in-house market promotional/consumer support activities. Series (1) represents UK applicants only and (2) represents total applications in the UK, from both British and foreign sources. The latter shows an average rate of growth during the 1970s which is similar to the earlier trend. The UK applicant series, however, is probably the more relevant, but is only available from 1960. This series has no upward or downward trend of note, but is highly cyclical.

Table 3.2 Trends affecting activity in functional areas *1

	Research and development	*Gross domestic production *2*		*Investment *3*	*Market promotion*	
		(1)	*(2)*		*(1)*	*(2)*
1955	37.2	67.0	64.8	46.9		71.4
1960	68.7	75.9	74.9	61.3	114.0	92.8
1965	84.7	88.9	87.6	83.6	101.7	90.8
1970	100.0	100.0	100.0	100.0	100.0	100.0
1975	96.6	109.1	95.7	104.9	95.5	100.9
1979	n.a.	121.4	101.7	105.4	103.9	117.1

*1 Index numbers, 1970 = 100
*2 Expenditure basis
*3 Gross domestic fixed capital formation

Sources: GDP and investment data-CSO, National Income and Expenditure (annually); R&D data-FBI (1947). Schott (1976) and DTI (1979), deflated by GDP deflator; market promotion index-trademark registrations reported in Patent Office *Annual Report of the Controller General of Patents. Designs and Trade Marks.*

Empirical results of the dynamic model of the demand for HQTM indicate a low degree of substitution possible between HQTM and other labour inputs. Thus, quite large changes in the price of HQTM (other things equal) would be necessary before there were appreciable changes in the demand for this type of labour. This result, however, should be treated with some caution. First, it is based on a model of demand (rather than on both demand and supply) and this may bias the results obtained (Tinbergen 1975). Second, it would have been interesting to have tested the degree of substitution possible between HQTM and more closely related groups (eg HNC/HND holders). The evidence reviewed in the discussion of the market below indicates a greater degree of substitution between more closely related groups.

While the demand for HQTM depends in part on the level of production (and therefore exhibits some commonality with the demand for other labour groups), it also depends on other activities of the firm that exhibit a greater cyclical behaviour. Thus, HQTM may be more vulnerable to reductions of job opportunities in a more sustained downturn than other, equivalently qualified workers and, because of their functional links, certain jobs filled by HQTM will be more susceptible to the adverse effects of cyclical behaviour than others (reflected not only in greater risks of redundancy, but in wider aspects of job prospects, such as promotion). Clearly, we would expect such a feature, insofar as it is realized by individuals, to be reflected in their supply decisions.

Government and the Demand for HQTM

Not only is the government a major employer but also, through its activities of funding and subsidizing, it influences the private sector's demands for such manpower. The preceding analysis is extended by focusing on trends in those variables falling under government control. While there has been a steady growth in total expenditure in real terms, this overall picture conceals wide variations in the government's level of funding. Its support for research, in particular, has remained almost stagnant throughout the period and has not grown during the 1970s. Defence expenditure also remained stagnant during the period 1967-77, although the government now appears to be planning something of an expansion of this area. Education, on the other hand, continued to grow during this period, but now seems destined to stagnate or decline. It would seem that, with the exception perhaps of defence in very recent years and education in earlier years, trends in these key expenditures have not led to a buoyant demand situation.

This conclusion is reinforced by a more detailed examination of the trends in government spending on investment (gross domestic fixed capital formation) and research and development. Table 3.3 indicates that the early growth in government investment during the 1960s again tails off during the 1970s. The overall growth of government investment is, however, to some extent, buoyed-up (and private investment depressed) by the transfer of industry from the private to the public sector. R&D repeats the pattern, but in this case, government funding of R&D was lower in 1978 in real terms than in 1964. Private industry shows a similar pattern, except that the trough of 1975 (which was substantially lower than the value in 1964 in real terms) was followed by something of a recovery.

ASPECTS OF SUPPLY

Qualification and Occupation

The main stocks and flows indicate that obtaining a degree in an appropriate subject area is not the only means of entry into an SET occupation. Table 3.4 provides some rather aggregate data that makes this point clear. It indicates that around 50 per cent, or somewhat less, of those in SET occupations in the period from 1961-71 were HQTM. Indeed, rather surprisingly, this proportion seemed to be lower in 1971 than in 1961. It also shows that a minority of HQTM were employed in SET occupations in the census years.

Nevertheless, obtaining a degree is now the primary route and, in the light of this, we adopt a sequential analysis of the flows through the education system and into various career options, focusing at each decision point on the factors that influence the individual to stop at that stage or to move on.

Table 3.3 Government investment and R&D expenditures *1

	Investment			*Research and Development*		
	Government *2	*Private*	*Total*	*Government* *2	*Private*	*Total*
1964	6620	8862	15482	1265	935	2200
1966	7534	9089	16623	1238	1064	2302
1969	8220	10701	18921	1313	1012	2325
1972	7669	12445	20114	1244	998	2242
1975	8887	11530	20417	1270	881	2151
1978	7477	16093	23570	1245	980	2225

*1 £ millions, in constant 1975 prices

*2 Includes public corporations, local authorities and central government (but excludes transfer payments between them)

Source: Investment data-CSO, *Annual Abstract of Statistics*; R&D data from Arrundale (1980, pp.99-109)

Table 3.4 Qualifications and Employment of SETs*

	1961	*1966*	*1971*
HQTM employed as SETs	45.6	44.3	41.9
SETs who were HQTM	51.3	45.4	46.7

* Percentages

Source: OPCS *Census of Population* (1961, 1966 and 1971)

The Different Routes into SET Occupations

Table 3.4 indicated the overall probability of an individual in an SET occupation possessing a first degree or equivalent qualification. Similar information is available for the engineering industry in 1971 (Venning 1975). Of 404 professional engineers with 3 or more 'A' levels, 384 took a first degree, of whom 51 went on to complete a higher degree: 313 of the 384 went direct to university (or equivalent) without passing any other examination first. Of the 112 professional engineers in the sample with 1 or 2 'A' levels, 90 obtained a first degree, of whom 10 went on to complete a higher degree. Smaller proportions of those with no 'A' level qualifications went on to obtain university degrees, although over 50 per cent did so and some of these completed higher degrees as well. The overall picture for professional scientists is very similar, although the evidence from the engineering sector indicates that this group tends to be more qualified at both school and degree level, a result confirmed from a variety of different sources.

The routes to becoming a professional SET have been changing over time. This seems clear from evidence of the routes followed by older, relative to younger SETs. The case of mechanical engineers again supports the overall findings of Table 3.4, with a trend toward HNC entry and away from the graduate route (Gerstl and Hutton 1966, p.42). These findings are somewhat surprising as we tend to expect that more recent entrants will be more highly qualified. The evidence for the engineering industry gives stronger support for the hypothesis that younger people (and therefore, in general, individuals who entered SET occupations more recently) tend to possess higher formal qualifications (Venning 1975). Evidence that this trend is more widespread, but of relatively recent origin, can also be found in Payne (1960, p.65), NEDO (1975, p.1) and Finniston (1980, p.47).

HQTM: Educational Routes of Supply

As formal education is an important avenue for those wishing to become professional SETs, the main educational routes are examined below. There are significant differences between the education and training histories of HQTM and other groups of qualified manpower. In addition, however, there are further important differences in the education of scientists, engineers and technologists (Venning 1975, p.68).

Certain school subjects are much more suitable as a basis for a student proceeding to higher education to study SET subjects. It is widely recognized that the UK has an educational system that is relatively inflexible in terms of subject mix. Thus, individuals tend, relatively early on, to be channelled into becoming 'science' or 'arts' students. It has been argued that:

> 'In this country, the total output of higher education is partly determined by decisions about whether to enter the 6th form taken at the age of 15 (ie at least 5 years before the age of completing higher education). Subsequent decisions about actual entry to higher education at the age of 18 also play their part. Similarly the balance in numbers between arts, physical sciences and biological sciences is partly determined by decisions taken at the age of 14 and very largely by the age of 16. The division within physical sciences between pure science and technology, and within biological sciences between pure science and medicine, is determined by the age of 18, while the division between

branches of technology is often not made until the end of the first year of higher education, if then.' (Moser and Layard 1968, pp.290-1).

Because of inflexibility in the British education system, the choice of school subjects commands a greater degree of importance than might have been expected (and certainly a greater importance than it would in many other countries). Some of the more important factors within the school environment that influence the choice of 'science and related' subjects are: the availability of appropriately qualified teaching staff (there have been widely recognized shortages of physics and mathematics teachers); the availability of appropriate teaching facilities (eg classrooms and equipment) for 'science and related' subjects (particularly as such subjects are relatively expensive to teach); the personal bias of teachers in favour of (or against) scientific subjects (Finniston 1980, p.25).

Other, even more significant influences may be at play outside the school environment (Foster 1968, p.410). There is, for example, the question of the individual's own aptitudes, although innate abilities in certain subject areas will be difficult (if not impossible) to disentangle from imagined capabilities (which may be inculcated within the individual by particular views and opinions held by people the individual has contact with). Recent worries have also been voiced that the nature of SET professions is widely misunderstood by the general public and this has the effect of inhibiting the supply of individuals into the relevant subject areas (Finniston 1980, p.25; Department of Employment 1980a). Evidence suggests that economic incentives (in particular, the availability of associated job opportunities) are the primary forces channelling individuals into particular subject areas (Foster 1968, p.410). In the UK relative salaries appear to play a significant part in explaining the decision to enter into higher education (Bosworth and Wilson 1980, p.314).

Such evidence leads to a consideration of the rate of return that individuals associate with various educational alternatives. Much of the relevant research in this area has been surveyed by Wilson (1980) and earlier estimates of the type reported below can be found in the same source. In common with many of the earlier estimates of other authors, these are average private rates of return to educational investment in alternative degree areas, calculated for the 16-year-old with sufficient number and quality of 'O' levels to undertake 'A' level studies. While this seems to be a key decision time for the individual, it is worth noting that the subjects taken at 'O' level will almost certainly influence, if not constrain, the choice of subjects at 'A' level. 'O' level experience and achievements, for example, may influence the perceived probabilities of the successful completion of examinations in various subjects. Linkages between 'O' and 'A' level subject areas are not examined here, although later linkages between 'A' level and degree subjects are explored.

Table 3.5 shows the average private rates of return to obtaining first degree qualifications in science, engineering and other subjects. The results are obtained from the census of population follow-up surveys. They indicate a downward movement in the rate of return from 1966/7 to 1970/1. In addition, and of considerable interest from our point of view, the results suggest a lower rate of return to training in science than in engineering and, overall, all SET related subjects yield a lower rate of return than other subject areas at this time.

Table 3.5 Average private rates of return for males*

	Science	*Engineering and technology*	*Other subjects*	*All subjects*
1966/7	15.5	16.0	17.5	16.5
1970/1	14.5	15.5	16.0	15.5

* Percentages

Source: Wilson (1980, p.52)

Table 3.6 reports more detailed information on rates of return using data from the professional institutes. The data indicate a lower rate of return in the 1970s than in the 1960s. On the other hand, the fall in the rates of return of the late 1960s and early 1970s appears to have halted, if not reversed, in the second half of the 1970s. The rate of return to this investment was higher than in the alternative, non-degree routes to becoming a professional SET and the main non-educational alternatives available.

Table 3.6 Average private rates of return*

	1967/8	*70/1*	*72/3*	*73/4*	*74/5*	*76/7*	*78/9*	*79/80*
Engineers	14.5	13.0	10.0	–	9.5	9.0	9.5	–
Scientists	14.0	12.5	–	8.5	–	9.5	–	9.5

* Percentages

Source: Wilson (1980, p.55)

Mathematics and physics 'O' levels are often quoted as a prerequisite for engineering studies (Gibbins and Fidgett 1977, p.30-1). Both mathematics and physics seem to have become more popular options amongst girls. Mathematics appears to have approximately held its own for boys, while physics has become more popular. The popularity of SET subjects at 'A' level, indicated by the proportion of passes in science and related subjects to all subjects, shows that the period 1961-73 is one of fairly dramatic decline in the popularity of SET subjects, a loss of ground which has not been recouped during the 1970s (NEDO 1975, p.5).

Evidence of the relevance of particular 'A' level subjects to further education in SET subjects is more clear cut. There is a considerable degree of overlap between the subject of specialization at 'A' level and the subject of degree followed (DES 1977, Vol. II, Table 14): 92.6 per cent of all students with science and mathematics 'A' levels who intend to follow a degree course plan to take their degrees in SET subjects; 91.6 per cent of all students with arts and social science 'A' levels who intend to follow a degree course plan to take their degrees in languages, arts or social studies; those with mixed science and arts 'A' levels are more evenly divided between the 'science' and 'arts' in their planned university courses.

The propensities indicate that 'A' level subjects are just as good an indicator of degree area for girls as for boys. The data, however, indicate the predilection for girls to opt out (or be channelled out) of science and related subjects prior to 'A' level (with 56.1 per cent of girls taking 'pure' arts and social science subjects, compared with only 29.8 per cent of boys). Although girls with science and mathematics 'A' levels are, overall, just as likely to take 'science, technology and related' subjects at university as boys, they have a much higher propensity to choose health and science subjects, rather than engineering and technology.

The school qualifications achieved prior to university have not been invariant over time. Analysis of the school achievements of different age groups shows the trend toward a more highly qualified school leaver. In the engineering industry, for example: some 58 per cent of professional engineers under 25 years of age had 3 or more 'A' levels, compared with only 14 per cent of those of 50 or over; three or more 'A' levels were held by 63 per cent of professional scientists in the under 25 group, compared with 27 per cent of the over 50s (Venning 1975, p.70). This source not only shows the much higher formal achievements of the younger age categories compared with the older groups, but also the scientists' higher levels of school qualifications compared with those of the engineers in every age group.

Different subject areas at university experience different qualities of students applying. The quality of entrants into engineering degree courses has been an area over which particular concern has been expressed by the Committee of Engineering Professors (Finniston 1980, p.78). Some indication of differences in quality may be obtained if we are willing to adopt 'A' level scores as a measure (constructed as a weighted average from the distribution of students with various numbers of grades of 'A' levels). The areas of science and of engineering and technology are in the middle of the pack (with ranks of 4 and 5 out of 8 respectively). The evidence reaffirms the considerably higher 'A' level achievements of scientists compared with engineers in each age group, indicating that this is not just a transitory phenomenon. Nevertheless, although engineering and technology courses still receive below average qualities of student (at least in terms of their 'A' level scores), they have experienced a significant improvement in scores over the last five years or so (Department of Employment 1980b). Thus, while engineering courses may have suffered from a major quality problem in the early to mid-1970s, this is now, to some extent, abating. While some care must be exercized in interpreting 'A' level scores as consistent measures of quality (Button and Fleming 1980; Lumsden et al. 1980), nevertheless, the joint evidence of the engineering professors' dissatisfaction with entrants and the 'A' level scores presents a consistent picture.

The next step is to extend our investigation of the flows from school to higher education. The information concerning the distribution of degree awards obtained on university and CNAA courses indicates that SET related subjects declined relative to other areas over the period 1973-77, falling from 42.5 per cent of the total of awards to 35.7 per cent. The decline in engineering shown by these aggregate statistics conceals a small growth in the relative importance of this area for female students, which is swamped by the numerically larger decline amongst males.

It is exceedingly difficult to assess the quality of the output of the university system. The most tangible measure of student performance is the grade of degree awarded. First class Honours were achieved by 7.3 per cent of men and 4.3 per cent of women who were awarded university first degrees in 1977. There are no immediately striking trends in the percentage of first class students in the various subject areas over this relatively short period. However, the data reveal the high percentage of engineering and technology students awarded first class Honours degrees. Thus, there appears to be a discrepancy between 'A' level achievements and degree grades attained. The empirical evidence indicates that, while 'A' level performance has a positive influence on the grade of degree obtained, it is of relatively minor significance (Button and Flerming 1980). Confirmation of this gap between 'A' level achievement and degree grades is provided by the results of the MORI survey of final year undergraduates in March 1980 (Burns 1980, p.1183). They indicate that, while social science and arts had higher percentages of entrants with grade A at 'A' level, it was in engineering and science subjects that the highest proportions of students expected to obtain first or upper second class degrees.

Migratory Flows

Before moving on to consider the stocks of HQTM in more detail, some consideration ought to be given to migratory flows, which were accorded a great deal of attention in the mid-1960s. The early literature on what was emotively termed the 'brain drain' soon realized that the migratory flows in the postwar period had been dominated by movements of professional people and, in particular, by flows of scientists and technologists. During the 1960s, for example, SETs were up to twelve times as likely to emigrate to the USA as people in other professions (Grubel and Scott 1969, p.242). Evidence for the mid 1960s indicated that the flows involved to the USA were often equivalent to a significant proportion of the annual output of first degree students in these subjects (Thomas 1969, p.256). The UGC data on outflows of newly qualified first degree holders from the UK indicates that under 4 per cent of graduates in engineering and technology emigrate immediately and, if anything, the percentage outflow has been smaller in more recent years. The percentage of higher degree holders emigrating immediately was over 4 per cent in all periods, and was substantially higher, at around 10 per cent, in the mid-1960s. It should be remembered that the data relate only to those graduates who emigrate immediately and plan that this will be permanent. Thus, the figures are an understatement in part because they do not include those who leave on a temporary basis (even if this later becomes permanent); and because they exclude all those who migrate after about six months of graduating.

Stocks of HQTM

Considerable research effort has been channelled into the construction of a consistent series of the stocks of HQTM from a number of different, intermittent and partial data sources (DTI 1971; DI 1977). These series are based on the stock figures provided by the censuses of population. Since 1971, therefore, they are constructed from flow data and cannot be tied firmly to other stock figures until the results of the 1981 census of population become available. Table 3.7 indicates that the stock of HQTM has more than doubled, with qualified scientists showing the more rapid rate of increase. Not all of the stock are available for work, however, as certain individuals may not choose to supply their labour at the going wage (the economically inactive) and not all of those willing to supply their labour may be in employment (the unemployed). The activity rate has declined for both groups, although it is considerably higher in each period for engineers and technologists than it is for scientists, particularly at the beginning of the period. The overall decline reflects the decline in the activity rates of men and, to a lesser extent the increasing proportion of women in the stock (Bosworth and Wilson 1980, p.300). The lower activity rate for scientists reflects the higher proportion of women employed in this occupational group. As a result of these features, the active stock has grown more slowly than the total stock.

Supply of HQTM into SET Occupations

There are a number of sources of information about the views of potential suppliers of labour services, particularly HQTM, concerning the nature of jobs that the respondents hope to obtain. The annual MORI survey of final year undergraduates provides information of this type. The survey does not ask in which areas individuals with certain qualifications are searching for jobs and does not, therefore, ask why they are looking in certain areas and not others. The survey does, however, ask a number of questions about career 'requirements' that, indirectly, reflect the sort of job that individuals will probably take. The responses indicate that many of the stereotypes associated with engineers and, to a lesser extent, scientists, are already present before they leave the university system. Science (and arts) students give recognition to the importance of scope for flair and creativity; engineers give greater emphasis to professional competence and the more practical aspects of their future jobs. Clearly, if engineering jobs are more associated with working with 'things' rather than with people and more with professional competence than with creativity, then engineering students will be predisposed (preconditioned) towards engineering jobs as opposed to the alternatives available.

Table 3.7 Stocks of HQTM*

	Scientists		*Engineers and technologists*		*Total*	
	Total	*Active*	*Total*	*Active*	*Total*	*Active*
1960	129	106	140	131	269	237
1965	166	135	175	161	341	296
1970	218	174	210	196	437	370
1975	292	228	272	237	564	465

* Thousands

Source: Department of Industry (1977, pp.5-7)

The PSI 'Survey of Former Students of Engineering and Science' collected information about how young engineers and scientists justify their choice of careers to themselves and to others (Berthoud and Smith 1980, p.86). The most important reasons for young engineers choosing a career as a professional engineer are: intrinsic interest in the job itself; a correspondence between their perceived talents and the nature of the job; prospects of promotion on merit; and prospects of good, long-term salaries. Least important amongst the factors listed were: value of the work for the community; opportunities for travel; starting salaries; and status of the job. The authors report some surprise concerning the lack of interest about status, particularly given the complaints amongst the main body of professional engineers.

Earlier, we explored the close relationship between subjects taken at 'A' level and at degree level. Data from the censuses of population indicate that this link also carries over from the subject matter of degree to the choice of occupations in SET related areas (DI 1976, pp.67-73 and pp.152-3). The data indicate the high probability that an individual with a degree in science will tend to hold a job as a scientist rather than an engineer and an individual with an engineering qualification will tend to work as an engineer rather than a scientist. However, the data also show that about 73 per cent of first degree holders in scientific subjects hold jobs outside SET occupations, compared with 64 per cent of higher degree holders in scientific subjects. In contrast, only 47 per cent of first degree holders and 49 per cent of higher degree holders in engineering subjects are employed outside SET occupations. It would seem, therefore, that, although a great deal of specialization is necessary in order to achieve the status of HQTM, this does not imply that the occupational choice of HQTM is wholly inflexible. While the degrees obtained are associated with a high probability that the individual will enter SET occupations, the labour market mechanisms appear to ensure a flow of such people into other types of jobs.

Changes in Subject between First and Higher Degrees

One piece of evidence that will be of some use when it comes to interpreting career patterns is the probability that students taking SET subjects at first degree level will swop to some other subject area for their higher degree. The flexibility that this might contain must be kept in perspective, however, as a minority of students actually move on to take a further degree. The census of population data show at least two interesting features: first, the high probability that engineering students will remain within their original subject area for their postgraduate qualification; second, the high probability that students who set off in the field of science will move outside SET subjects entirely for their postgraduate qualification (DI 1977, pp.144-5).

Career Patterns

There is a tendency to think of the link between educational attainments and the current functional distribution of SETs as being quite straightforward, with individuals flowing out of the higher educational system with their science or engineering degrees into the occupations of scientists or engineer respectively. Table 3.4, however, indicated that things are more complicated than this, with the possibility of non-degree candidates obtaining jobs as professional SETs. In addition, the table indicates that, for the period 1961-71, well over 50 per cent of HQTM were not employed in the SET category and this proportion was increasing.

Gerstl and Hutton (1966, p.84) examine the first employment of members of the Institute of Mechanical Engineers in the UK. The information indicates different ports of entry for graduates and non-graduates. In the main, non-graduates start on a lower rung of the ladder and younger people (both graduate and non-graduate) reported starting somewhat higher up the ladder than their older counterparts (Gerstl and Hutton 1966, p.85). Finally, the authors point to the fact that an individual's educational attainment and starting point (which are themselves related) further conspire to influence the future career path (eg a graduate beginning as an assistant engineer was more likely than others to achieve a managerial post).

The evolution of careers in the engineering industry was investigated by Venning (1975, pp.84-87), using information from curriculum vitae. There are again important differences between scientists and engineers, in this instance, in their method of entry into work. Scientists are more likely to have entered as professional scientists by direct employment, rather than to have worked their way up through craft and technician employment, which is more common amongst engineers. Direct entry, with additional, post-graduation training provided by the firm, has been increasing in importance amongst younger entrants, while entry via the technician and craft employment routes has been declining in importance. The type of entry also depends on the functional area in which the individual is to be employed. In the case of engineers, entry via craft or technician employment is much more likely in production than in R&D, while entry by direct appointment is more likely in the case of R&D than in any other function. In the case of scientists, entry via direct appointment is more than twice as likely for R&D as for any other functional area while, again, the more traditional routes of entry via craft and technician employment are more important in production (and to a lesser extent services) than in other areas. Clearly, in an analysis of the operation of the labour market for SETs, the levels of activity in these various functional areas are going to play a significant role.

Venning (1975) reports on the numbers of job changes of scientists and engineers in the engineering industry. Job changes that involve a change in functional area are some indication of the degree of substitutability between functions. Venning (1975) considers changes between the functions of commerce, RD&D, production and services. The results indicated that some 62 per cent of job changes reported were within the same functional area. Only 25 per cent of all SETs in the sample (ie including those who had not changed jobs at all) had held jobs in more than one function. Of the moves that took place, the most important were from production into RD&D (33 per cent of the moves); from services into RD&D (20 per cent); and from RD&D into production (15 per cent). Movements between other functions were minimal (all less than 5 per cent). While the flows indicate that some substitution of manpower occurs between RD&D and production (and, to a lesser extent, RD&D and services), there is little evidence of this for other functions.

This survey, by its very nature, was not able to investigate the flows outside the four functional areas in which the occupational group SETs are employed. Venning (1979) therefore provides an interesting extension to her earlier work. This survey, which was undertaken in 1972, investigates the proportion of managers in the engineering industry who held jobs as SETs, draughtsmen or other technicians immediately prior to obtaining a managerial appointment. The results indicate that 30 per cent come from these three categories, with 15 per cent coming from SET occupations alone.

Further information is also given about the previous jobs of managers in the sample who entered management via a scientist or technologist post (Venning 1979, p.33). Some 33 per cent of scientists who went on to managerial posts held jobs as draughtsmen or technicians prior to becoming SETs. A much higher proportion, some 45 per cent, entered SET occupations directly from further education. It is fairly clear from this evidence, therefore, that a small, but nonetheless significant proportion of individuals appear to use SET employment as a stepping stone to a job as a manager. It should be added that the figure of 15 per cent probably understates the role of SET occupations as a stepping stone. There were a number of individuals who held a job as an SET at some earlier point in their career, but were not employed as an SET immediately prior to obtaining a managerial position. From the partial evidence available, however, the numbers do not appear particularly large.

Berthoud and Smith (1980) collected information about career histories that provide some important insights about the average speed with which individuals have progressed through the various stages of their careers. The movement from sub-professional to professional tends to occur at a fairly early stage. By the age of 35, for example, only 18 per cent of professional engineers classified themselves as sub-professional. Movement into the managerial category, however, was achieved by only a very small percentage of those under 25 and was much more evenly spread over ages up to 50, although still somewhat more likely to occur in the younger age groups (ie 30-35). Further information given by Bethoud and Smith (1980, pp.19-20) confirms the earlier evidence of Gerstl and Hutton (1966, pp.100-101) that progress to professional or managerial status is faster for more highly qualified people.

Berthoud and Smith (1980) also investigate age-related changes into different functional areas (ie those remaining as a practising engineer, but moving between RD&D, supervision of engineering operations, and other engineering activities) and analogous changes between types of work (ie between practising engineer, not a practising engineer but using engineering knowledge, and non-engineering not using engineering knowledge). The results indicate much higher incidences of change in both function and type of work amongst younger employees. The changes in type of work are again related to the movement into management and this is reflected by the growing proportion of individuals using engineering knowledge but not employed as practising engineers.

THE MARKET

Employment of HQTM

Supply and demand features are now integrated in an analysis of the market.

To date, however, no information has been given about employment by industry. While this is the most comprehensive information available about the employment of HQTM in the UK, it is out-of-date, the last observation being for 1971. It seems unlikely that there will be any improvement until the results of the 1981 census of population become available. From the information provided in Table 3.8, all industries appear to have shared in the rise of employment of HQTM over the period 1961-71, the only exceptions being agriculture and mining and quarrying (subsumed in 'other industries'). The table indicates the concentration of qualified engineers and technologists in production industries, while qualified scientists are disproportionately represented in professional (mainly educational) services and to a much lesser extent in manufacturing.

Table 3.8 Employment of HQTM by industry *1

	Qualified in science			*Qualified in engineering or technology*		
	1961	*1966*	*1971*	*1961*	*1966*	*1971*
Engineering	9.4 (8.6)	12.3 (8.9)	17.0 (9.6)	45.3 (33.5)	51.4 (31.2)	59.6 (29.6)
Other manufacturing	20.7 (18.6)	23.9 (17.1)	33.4 (18.7)	18.9 (14.0)	22.3 (13.8)	28.9 (14.5)
All manufacturing	30.0 (27.1)	36.3 (26.0)	50.3 (28.0)	64.1 (47.3)	73.5 (44.8)	88.4 (44.1)
Public utilities *2	1.4 (1.3)	2.9 (2.1)	4.7 (2.6)	19.0 (13.9)	21.9 (13.3)	25.1 (12.6)
Construction	0.3 (0.3)	0.8 (0.6)	0.9 (0.5)	8.6 (6.4)	14.1 (8.6)	16.4 (8.2)
Professional services	58.8 (53.2)	74.0 (53.0)	89.0 (49.6)	22.3 (16.5)	28.6 (17.4)	35.6 (17.6)
Public administration	5.6 (5.1)	7.2 (5.2)	11.2 (6.2)	12.7 (9.4)	13.6 (8.3)	19.9 (9.9)
Other industries	14.1 (12.7)	17.9 (12.7)	22.7 (12.7)	9.0 (6.6)	12.6 (7.6)	15.2 (7.6)
All industries	110.7 (100.0)	139.6 (100.0)	179.5 (100.0)	135.6 (100.0)	164.2 (100.0)	200.7 (100.0)

*1 Numbers in thousands, figures in parentheses are percentages
*2 Includes transport and communication

Source: Department of Industry (1977)

The growth in employment and the changing distribution of HQTM could, in principle, simply reflect the differing growth in total employment of the various industry groups. It can be shown that this is not the case, however, using figures on the density of SET occupations in total employment. In the case of engineers, the density has been growing steadily in all the industry groups. The growth within the engineering sector stands out in particular. Scientists also show an increased density in the majority of industries (although not in engineering and 'other industries'). The growth in density of scientists has been particularly strong in the professional services group (mainly in educational activities).

Labour Market Indicators of Absolute Shortages

A large number of reasons why shortages may occur in this market have been suggested, including 'dynamic shortages', caused by the lagged adjustment of supply in the face of continuing outward shifts in demand (Arrow and Capron 1959) and periodic shortages of the 'cobweb' model, caused by the lagged adjustment of supply to changes in demand when there is imperfect information available (Freeman 1971). This section examines the available UK statistics relating to shortages and surpluses of HQTM.

One very crude comparison that can be made is between the number of HQTM available for work and the number of SETs actually in employment. This measure indicates the size of the unused pool of labour having the prerequisite skills that can be called upon as the labour market tightens. Table 3.9 indicates that, while the number of qualified scientists actually exceeds the number of jobs for professional scientists, the opposite is true for engineers. Thus, a negative 'gap' is observed for scientists and a positive 'gap' for engineers. In addition, the indications are that the already slack labour market for scientists has become more slack over time, but that, in the case of engineers, the absolute gap remains roughly constant over the period from 1966. Taken as percentages of the relevant stock figures, the percentage gap increases for scientists, but decreases in the case of engineers. Thus, a simple interpretation of the two 'gaps' would be that the market for engineers and technologists is relatively 'tight', while that for scientists is relatively 'slack'. It would appear that, insofar as these two groups have no close substitutes, the same proportionate upsurge in demand is likely to run up against constraints more quickly in the case of engineers and technologists than in the case of scientists.

A considerable amount of discussion occurred, particularly in the 1960s, about Britain's low ratio of engineers to scientists and HQTM to non-degree labour compared with, say, the USA (Peck 1968). It was thought at the time that this might well be a reflection of crucial shortages of key types of manpower in the British economy. In reviewing the main body of this evidence, it seems sensible to return to the question of the ease with which firms can substitute for these types of labour. The greater the ease of substitution, the less likely there are to be shortages, as firms can turn to other sources. In addition, it must be noted that there is unlikely to be a precise 'optimal ratio' of HQTM to other types of labour, deviation from which will result in substantial private or social losses. Finally, if two groups with different training programmes and costs are roughly equally capable of doing the same job, the economy will optimize its position when it elects to produce the cheaper variety.

Table 3.9 Gap between potential supply and actual demand*

	HQTM available		*Jobs*		*Gap*	
	Scientists	*Engineers*	*Scientists*	*Engineers*	*Scientists*	*Engineers*
1961	112	137	51	207	- 61	70
1966	142	167	59	284	- 83	117
1971	184	205	68	324	- 116	119
1976	240	242	77	357	- 163	115

* Thousands

Source: Bosworth and Wilson (1980, p.306)

It was suggested by Peck (1968) that the extremely high ratio of scientists to engineers in Britain in the 1960s could be traced to a shortage of engineers which employers had attempted to accommodate by recruiting larger numbers into other occupations such as scientists and technicians. Data compiled by the OECD for the year 1959, indicated that of all the industrialized countries for which data were available Britain worked with the lowest ratio of engineers in the workforce (OECD 1963). In addition, the low ratio of engineers to total workforce in the British economy, can be traced back to the turn of the century (Black and Stigler 1957, p.147). Finally, the ratio of scientists to engineers in British R&D in the mid 1960s was around three-to-four, compared with only one-to-three in the USA (Peck 1968, p.456).

One interesting piece of evidence relating to the question of substitution concerns the degree of specialization of scientists and engineers. Shortages of, say, engineers are likely to be more acute the more specialized such people are in their education and training. Early evidence for UK mechanical engineers indicated that as few as 44 per cent of their number studied only mechanical engineering subjects (Gerstl and Hutton 1966, p.57). The other 56 per cent had studied or trained in one or more other branches of engineering. Some 37 per cent of these had trained in electrical engineering. The authors do, however, report an increased tendency for younger engineers to be more specialized.

Peck (1968, p.458) extends this concept (what he calls the 'cross-over' phenomenon) to look at the scientific training of engineers, and vice versa. He reports the fact that the 1961 census of population indicated that some 3.4 per cent of mechanical engineers and some 5.5 per cent of electrical engineers had formal science qualifications. The evidence for 1971 indicates that 7.7 per cent of engineers had first degrees in a science subject, compared with 3.5 per cent of scientists who had a first degree in an engineering subject; only 1.3 per cent of engineers had a postgraduate qualification in science, compared with 3.2 per cent of scientists who had a postgraduate qualification in engineering.

Although the percentages were small, Peck (1968, p.456) sees this overlap as one of the reasons why Britain was able to sustain such a high ratio of scientists to engineers by international standards. He argued, however, that this extreme form of compensatory action was not without costs in terms of economic performance. Of several solutions he proposed, one was a special conversion programme to transform scientists into engineers (Peck 1968, p.465), an idea taken up by the Finniston Committee (Finniston 1980, p.74). Peck argued that such programmes could be a major device to recruit the more able science students into engineering.

A parallel argument was that Britain had a high technician-HQTM ratio compared with other countries (ie 4.2 technicians per HQTM in the UK compared with 0.6 in the USA), which could be attributed to shortages of engineers. A similar finding applied to support staff in the R&D function where Britain had some 2.6 support personnel per HQTM compared with 1.7 in the USA (Freeman and Young 1965, p.72). This type of evidence of shortages should be treated with some caution, however, because the UK definitions of professional SETs may be more strict than the USA's, implying that the top end of the technician group in the UK is more akin to the bottom end of the US SET group. Evidence on the ease of substitution also suggests that even if shortages are indicated one should be careful not to overstep the mark in interpreting the size of the underlying problem. This depends on the extent to which the ratio can be varied without adverse effects on performance. In this instance, one of the main grounds for believing there is scope for substitituion is that there is often thought to be a considerable degree of overlap in the tasks undertaken by technicians and HQTM. In an early USA study, for example, it was suggested that some 64 per cent of engineers' work (in terms of time allocated) could be undertaken by technicians (Merrill 1960). In the case of the UK, it has been a common and long-standing complaint amongst engineers that too much of their time is spent on mundane tasks, many of which could be allocated to technicians without any great productivity loss (Gerstl and Hutton 1966, p.75).

The relative wage and employment data for the two countries can be used to construct a measure of the ease with which technicians can be substituted for HQTM. This calculation indicates that technicians and HQTM are close substitutes. Such a simple comparison is clearly suspect (but perhaps no more so than cross-country comparisons of technicians to SET ratios). The case study evidence of Mace and Taylor (1975) for twelve UK firms, covering some 500 engineers, however, confirms the fact that firms appear to be able to replace engineers by scientists and technicians. Skolnik (1975) obtained similar results for substitution between technicians and engineers in Canadian manufacturing industries.

While too much emphasis should not be placed on the results of any one study in isolation, they all appear to indicate that substitution is relatively easy between these categories of occupation (or qualification).

It is probably true that the degree of substitution between these two groups in the UK has been declining with the passage of time, linked, in part, with the decline in the technician/craftsmen routes to SET occupations. It should also be borne in mind that the dominance of the graduate route is a relatively recent phenomenon. Nevertheless, even if the two were closer substitutes in the 1960s, the relatively heavy reliance of the UK on craftsmen was itself the cause of some concern at the time (Peck 1968, p.460; Fielden 1963, p.19). It is interesting that the Finniston report appears to conclude that the pendulum may have swung too far towards purely academic courses. The report suggests a greater amount of engineering education should take place within industry through sandwich courses and that perhaps the more traditional routes should be maintained and even strengthened.

The tentative evidence about the relative ease of substitution between the occupational categories (ie SETs and technicians) clearly casts some doubt on the use of occupational ratios as indicators of shortages. On various occasions, however, we have returned to the problem that occupations are not synonymous with education levels. Could it be that substitution between more and less qualified personnel is less easy? If so, the occupational substitution might arise because individuals of the same education level in different occupations can be exchanged.

A large amount of empirical evidence exists about the degree of substitution between people with different levels of education (although the bulk of this evidence is not related soley to SET subjects). These studies basically test relationships between the proportions of the population with certain levels of education and the relative incomes of these groups. While too much reliance should not be placed on any one study, viewed as a whole they exhibit a certain degree of consistency in their findings. Taken at face value those studies which allow the value to be determined by the model indicate relatively high elasticities of substitution: in other words, relatively easy and costless substitution between education levels for employers (for a review, see Tinbergen 1975). Nevertheless, this consistency in the results is largely overshadowed by the large degree of variation in the estimated sizes of the elasticities. Particular concern has been expressed over this feature of the results and it has been argued that it might well arise because of the failure to specify the demand equation properly or because of the failure to include a supply equation explicitly. Modifying them in the light of this, it is possible to show that the absolute values of the elasticities tend to fall somewhat (though converging on a value that still indicates a considerable ease of substitution) although a significant degree of variation remains and the associated supply elasticities were far from uniform (Tinbergen 1975).

One of the most commonly used indicators of a tightening (or slackening) labour market is a reduction (or increase) in unemployment or in the unemployment/vacancy ratio (U/V). While unemployment information relating specifically to all HQTM is not available, unemployment levels amongst newly qualified persons are revealed in the survey of first destinations of university and polytechnic graduates (See Chapter 2, Table 2.8, and Department of Employment 1980b). While those qualified in science come quite high up the unemployment rankings, particularly at first degree level, those qualified in engineering/technology (with the exception perhaps of female polytechnic students) do very much better, appearing quite low down the unemployment rankings, at both first and higher degree levels. The evidence shows that engineering and technology students are considerably less prone to unemployment at this stage in their careers than science students, 'all other' graduates and 'all workers'. The position of science graduates, on the other hand, does not appear to be greatly different from that of the 'all other' group.

The evidence of unemployment statistics would seem to indicate that the market position of engineering and technology students has been strong relative to most other graduates. However, the data relate to unemployment only some five or six months after graduation. In this respect, there is evidence from the annual MORI survey of final year undergraduates that engineering students do tend to apply for their jobs earlier during the course of their studies (Burns 1980, p.1182). By March of 1980, 76 per cent of engineering students had applied for jobs compared with 48 per cent of 'arts' students. In response to the argument that the timing of applications tends to bias the observed unemployment of engineers downward at this time, it might be countered that engineers also had a significantly higher success rate in obtaining interviews than other undergraduates. The reason for this, however, might be very different. For one thing, the success rate in obtaining interviews may reflect the fact that this is the correct time for engineers to be applying (as their application rate also suggests). It may also be a reflection of the fact that, if engineering students in earlier years were of relatively poor quality, potential employers might be taking a long, hard look at candidates. This notion is certainly not inconsistent with the fact that the percentage of engineers (and, even more so, of scientists) who had been offered jobs was no higher (and often below) the position in other subject areas. One final piece of evidence from the MORI survey of final year undergraduates is that, of those students offered jobs by March 1980, a smaller proportion of engineering students had accepted than of students in other subject areas. Burns (1980, p.1183) interprets this as a reflection of the 'more confident' attitude in engineering than in other subject areas. It is certainly consistent with the high salary expectations of this group, which we explore below. Of course, there is an important question mark against such expectations actually being fulfilled.

While the position of new entrants is a particularly interesting acid test of the state of the labour market, we should also have a look at the overall U/V position for SET occupations. High U/V ratios may be associated with a relatively slack labour market (a possible position of excess supply) and a low ratio, a relatively tight labour market (a possible position of excess demand). It should be borne in mind, however, that the ratio of unemployment to vacancies has many problems as a consistent indicator of the market position for a particular occupational group over time. Analogous comparisons of U/V ratios between occupational groups are fraught with even greater difficulties.

Table 3.10 Unemployment/vacancy ratios of SET occupations *[1]

	Scientists	*Engineers and technologists*	*All professional and related*	*All occupations in the economy*
1973 *[2]	2.6	0.9	0.9	1.6
1974	2.8	0.9	0.9	1.5
1975	3.1	1.4	1.8	5.0
1976	6.4	2.[illegible]	3.1	9.0
1977	8.7	3.1	3.9	7.3
1978	14.0	2.6	3.2	5.3
1979	9.0	1.9	2.5	4.0
1980	8.6	2.1	3.4	8.3

*1 U/V ratios are based on unrounded values of U and V
*2 Figures relate to position in June of each year

Source: Department of Employment *Gazette*

The information contained in Table 3.10 indicates that the markets for the categories of labour distinguished all appear to have become substantially slacker over time, with higher U/V ratios during the second half of the period. If we were willing to accept the data at face value and undertake inter-occupational comparisons, engineers and technologists would seem to have experienced a substantially tighter market position than scientists or other professional and related groups. While the evidence is consistent with a relatively tight labour market for engineers, it also appears to suggest an excess supply of all categories investigated, rather than a shortage. Nevertheless, the data are rather aggregate and may hide shortages in particular markets. While we would anticipate that the position would prove to be different between graduates and non-graduates within each of these groups, there are no data available to test the hypothesis.

The final measures relating to shortages (or surpluses) of HQTM focus on movements in relative salary levels. If, for example, a shortage of HQTM occurs, it may be anticipated that employers, in an attempt to attract this type of labour, would bid up wages. A surplus, on the other hand, would depress wages. In practice, all wage negotiations have taken place against a general background of rising wage rates and prices and so it is more revealing to focus on relative wage movements.

Table 3.11 provides a summary of the annual data on relative salary movements of various groups of workers. The first two columns report the earnings of members of scientific and engineering institutes. The series for professional engineers grows faster than the corresponding series for scientists over the period from 1960 to 1974, which is consistent with a relative shortage of engineers. Since then, however, the increase for professional scientists has been faster than for engineers; though it should be added that this result should probably be viewed against a background of excess supply in both groups because, as the series for manual males and all workers reveal, the salaries of professional engineers and, more particularly, of scientists, have grown more slowly over the whole period than for non-HQTM groups.

Table 3.11 Relative salary movements of HQTM and other workers*

	Professional scientists	*Professional engineers*	*Non-manual earnings*	*Manual earnings (males)*	*Index of average earnings (all workers)*
1960	67.8	60.8	64.6	63.3	
1965	90.5	84.4	84.3	84.7	84.6
1970	115.0	115.6	115.0	116.1	123.2
1975	188.3	201.4	195.0	227.5	266.8
1979	334.5	329.5	360.9	390.6	445.9

* index numbers, 1968 = 100.0

Source: Bosworth and Wilson (1980, p.310)

Focusing on relative salaries can only be completely meaningful in a world where market forces govern the wage/emplyment outcome. The period covered by Table 3.11 is one where incomes policies (which consistently favoured the lower paid) have been applied at various times and some part of the erosion of salary differentials may be the result of the suspension of normal market operations. Under such circumstances, it may be possible for shortages of HQTM to have occurred even in a period when relative pay was falling. If this is the case, however, it is difficult to understand why employers have not been able to realign engineers' salaries during 'policy-off' periods, particularly if shortages have been as acute as some authors have suggested.

Recent evidence from the MORI survey of final year undergraduates looks at the expected starting salaries of students in various subject areas. In 1979, engineers' expectations of starting salaries were some 17 per cent higher than those of arts students and, by 1980, this had increased to about 22 per cent. Comparison of 'A' level scores indicates that the higher expectations of engineers appear to have little to do with their academic ability. Thus the expected salaries may reflect market forces, as perceived by the students themselves. Of course, starting salaries are not the only factor influencing the choice of job. Data from the MORI survey, however, indicated that final-year engineering students appeared to think it more important than did students in other subject areas (Burns 1980).

The final indicator of market imbalance considered in this section is the rate of return to becoming a professional SET. Tables 3.5 and 3.6 indicated that the rate of return to becoming an engineer was generally higher than the equivalent rate of return to becoming a scientist, although the difference was not large. The rates of return to both are significantly lower in the 1970s than they were in the 1960s, although the downward trend levelled off by the second half of the 1970s. The evidence again suggests a slackening of the labour market for both groups. The rate of return evidence does not suggest any significant shortage of engineers relative to scientists. If anything, the opposite appears to be the case, with the slight narrowing in the rates of return reflecting in part the growth in scientists' salaries relative to engineers'.

One interesting question, however, is the extent to which the currently low rates of return might depress the numbers and quality of potential entrants into the education system to study these subjects, resulting in shortages at some future date, along the lines suggested by the cobweb model. Tentative evidence for the UK suggests that relative earnings do play a significant role in determining the individual's choice of education route. Individuals tend to become locked into the education system (both in terms of the length of course and the chosen subject area), appearing on to the market with a substantial lag, reflecting the relative market positions some years earlier. Thus, the UK can be expected to exhibit a cobweb cycle, along the same lines as the one found in the USA (Freeman 1971).

The question of possible shortages of engineers has intrigued economists for some time. While industrialists appear fairly certain of the existence of acute shortages, economists remain far from convinced. Wilkinson and Mace (1973), for example, conclude that it is hard to find any case for a shortage of engineers in the 1980s. From the evidence provided in this section it would seem that the labour market for engineers was tighter in the 1960s than in the 1970s and, although there may be limited pockets of shortages, there is no case for arguing that there are widespread unsatisfied demands for this type of labour. There is, however, a certain amount of evidence to suggest that the labour market is considerably tighter than that for scientists, with significantly smaller untapped reserves, and that a sudden upsurge in demand could lead to temporary shortages, although, even then, these vacancies might be filled at little extra cost by other types of labour.

Maldistribution of HQTM

We turn very briefly to the hypothesis that Britain has suffered from a maldistribution of its HQTM. A maldistribution of resources will accentuate shortages (or surpluses) in particular areas and apparent shortfalls of HQTM may dissolve when a more efficient distribution is effected. What then is meant by maldistribution? It occurs when welfare improvements are obtained by transferring individuals from low to high productivity activities, other things being equal (Peck 1968, p.476; Sargent 1973, pp.360-1).

There is a substantial amount of qualitative evidence that Britain had experienced a continuing maldistribution of resources. It has been argued, for example, that Britain attempts to do more in the field of science and technology than its manpower resources permit (Peck 1968, pp.448-450). This is reflected in Britain's extremely high R&D expenditure per qualified person compared with other industrialized countries, caused by an unwarranted commitment to basic R&D and to aerospace, which creamed off too many high quality HQTM from industry, when manufacturing industry in fact was the real key to Britian's future prosperity. This historical imbalance would seem to have continued for a surprisingly long period. It has probably been fuelled by a number of factors: by the two World Wars; by a series of governments willing to back extremelly large, non-commercial, prestige projects (Stubbs 1980); and by the ability, particularly in earlier years, to substitute technicians, craftsmen and (more recently) scientists for engineers, without any immediately apparent costs, but with potentially more severe longer-term consequences. It may be that the position in very recent years has been changing, with the downward trend in government funding of basic research and the ending of the Concorde project redressing the balance. What is clear, however, is that the demands for HQTM arising from government activities (which are often the result of non-market forces) may have been instrumental in causing a tighter labour market in the private sector for HQTM (and in particular for engineers) than would otherwise have been the case. In manipulating the supplies of HQTM, the government should take into account the consequences of its own activities and should design policies within the context of an overall science and technology policy, something which seems to have been sadly lacking in Britian.

Expressions of Opinion by Employers

There is a large body of 'hearsay evidence' about shortages in qualified engineers in both Britain and the USA in the 1950s and 1960s. Carter and Williams (1957, pp.87-107) review much of the early postwar evidence for the UK and similar evidence can be located throughout the 1960s. The amount of discussion of shortages has abated somewhat in more recent years, but periodic complaints are still made (NEDO 1975, p.3; Finniston 1980, pp.52-3). While such evidence must be taken into account, it has proved suspect on several occasions: in part, because employers do not always behave in a manner that is consistent with the market position they claim to face (CPRS 1980, p.4; Finniston 1980, p.58). Nevertheless, pockets of real shortage almost certainly do exist. In a sense, this is only to be expected in a market economy, where there is not perfect mobility of labour, and is consistent with the existence of surpluses in other areas. It is therefore difficult to use such evidence as an indication of overall shortages (Finniston 1980, p.53).

There may be more strength in the view that there has been and, probably, still is a problem with the quality of engineers available to employers, a theme which we keep returning to. As the evidence presented before Finniston suggested:

> 'There was a widely held belief among home employers that this high quality does not extend in sufficient depth among the current stock and prospective supply of engineers. Concern was repeatedly expressed to us from all sides: (i) that there were too few high calibre engineers and hence intense competition for them (including competition from foreign sources); (ii) that the remaining body of graduate engineers lacked the qualities of practical application and understanding of industry associated with those who came through the old, part-time route; and (iii) that those engineers with potential for technological or managerial leadership are lost to manufacturing employers in favour of public sector employment, 'glamorous' research-based, high-technology activities or opportunities overseas.' (Finniston 1980, p.54)

This links up with one final piece of evidence concerning the large expenditures by employers on education and training after the individual leaves the university system. Such information has been collected for engineering by the Engineering Industry Training Board (Brayshaw, Fairley and Wheeler 1979). The substantial expenditures involved indicate that the education system does not produce a polished product that can be immediately assimilated by employers. This would be expected if the education system were to impart general training and if post-graduation training were to impart specific training (ie knowledge relevant only within the employing firm). It is difficult to assess how much the former is a prerequisite for the latter as opposed to being a rather expensive (from society's point of view) filter mechanism. The question of higher education acting as a screening device which enables potential employers to weed out less able candidates is likely to be less important for vocationally-orientated courses and related employment. But some of the considerations arising in Chapter 4 are nonetheless relevant even here.

Expressions of Opinion by Employees

The PSI 'General Survey of Professional Engineers' solicited information about whether engineers were satisfied with their jobs (Berthoud and Smith 1980, ch.6). The results were largely consistent with those obtained in the parallel 'Survey of Former Students of Engineering and Science' (Berthoud and Smith 1980, ch.14). The general consensus was one of satisfaction with their jobs. Nevertheless, this overall position was formed from contrasting opinions amongst engineers in different jobs. While managers, for example, were generally very satisfied, certain others were much less so. They appear to rate highly the technical and creative aspects of their jobs, but they were much less enamoured of their earnings position and their wider status in the community. It is perhaps worth adding, however, that there are some grounds for concern over the general public's view of the status of the engineering profession (recognized by engineers themselves, with a certain degree of paranoia). This relatively lowly position stems partly from an ignorance of the tasks professional engineers perform, which itself is partly a reflection of the use of the generic term 'engineer'. Clearly such factors may be of some importance in influencing the views of potential engineering students, particularly female candidates (Department of Employment 1980a, p.26).

Finally, there is the question of the use of HQTM to undertake relatively mundane tasks, which are not consistent with the general view of the activities that comprise the job of professional SET (EITB 1975). Improvements here would have several potentially beneficial effects. First, it would improve the utilization of existing manpower, making it more efficient. Second, it would effectively increase the stock of what is, in relative terms, a scarce resource. Third, it would help to improve the status of engineers. The Finniston report laid particular emphasis on a more effective use of existing stocks of engineers (Finniston 1980, p.72).

Demand, Employment and Societal 'Needs'

In analysing the demand for HQTM (particularly in the context of shortages of such manpower) an important distinction is often made between the amount of this labour actually demanded and the amount that 'ought' to be demanded in order to achieve some 'optimal' position from society's point of view (Moser and Layard 1968, p.291). In equilibrium, in a free market situation, both buyers and sellers are satisfied with the going wage and quantity. This is a satisfactory outcome if the amount of labour services traded on the market has no effect on other groups in the economy. However, other authors have argued that employment of HQTM does have positive wider effects and, by implication, therefore, 'needs' exceed the actual level of demand arising from free market forces (Finniston 1980).

In order to employ the socially optimal amount of HQTM, it may not be sufficient for the government to act simply on the supply of labour (Moser and Layard 1968, p.292; Finniston 1980), certain demand conditions may also have to be altered. As we have seen, the government already takes such action in a wide number of areas (eg funding R&D and underwriting prestigious projects, such as Concorde). Clearly the current level (and the recent downward trend) may not be conducive to achieving a social optimum. Without a sufficiently buoyant market for HQTM, the rate of return to this educational route cannot be adequately affected by tinkering with the subsidies in education (eg the supplement to the grant for engineering students proposed in the Finniston Report). Even if the grant were increased substantially, the impact on employment would still depend on the demand for HQTM. In particular, without any change in the level of activity, it would depend on the responsiveness of demand to a falling price of HQTM as the new supply forced itself on to the market. It would also depend on what happens to the supply of HQTM itself, as the falling wage caused individuals to enter the inactive stock or to seek employment in areas outside those traditionally filled by such labour. Reactions of this type might well mean that many of the potential social spin-offs (which were the underlying reason for stimulating supply) may not be observed in practice. Such moves, with falling relative wages and slackening labour markets, are also unlikely to increase the quality and status of HQTM which, in the case of engineers has posed particular worries.

One hope of those who advocate an increase in supply is that this will itself raise demand, in particular because of the improved quality of British products (Finniston 1980). Proponents of this view, however, appear to have ignored the time lags between new engineers coming on to the market and the resulting improvements in overall performance of the economy. What the empirical results reviewed above do indicate, however, is that, if the government introduces a typical reflationary package or, somewhat less likely, if the government starts to lay the foundations for longer-term, sustainable growth through a co-ordinated investment programme in areas such as R&D and the stock of physical capital, then the demand for HQTM can be expected to increase disproportionately. The question then arises whether the mechanisms of supply can cope with such an upturn.

One final point is that there may be a stronger case in arguing for an increase in the quality of HQTM on social grounds, rather than for an increase in their numbers. Again, this is something that the Finniston Committee were particularly worried about. The case for this seems to lie in the growing belief that many of the key export areas where Britian should be concentrating her main efforts are less sensitive to price reductions than to quality increases which, in turn, depend on the quality of the stock of

HQTM. Improvements in this direction would raise profitability and provide a greater incentive for economic expansion.

CONCLUSIONS

The indications are that the labour market for HQTM is extremely complex. Not all HQTM are employed in SET occupations and not all SETs possess formal educational qualifications at degree (or equivalent) level. Even those who have formal qualifications have reached professional SET status by a number of different routes. In addition there is also the question of functional activity to consider which, while important from the viewpoint of understanding the employment of HQTM, bears a fairly complicated relationship with education and occupation. The evidence also suggests that there are separate, although closely related markets for scientists and engineers and for SETs and technicians.

The alternative routes to becoming an SET are particularly interesting. First, different routes have different costs. Second, the distribution of the costs of education are borne by different groups, depending on the route taken. The ease of passage via alternative routes and the differing costs attached to them (as well as the different rewards associated with success) are clearly important influences on the numbers undertaking different types of training. Such a comparison ought to be broadened to consider differences in the routes to HQTM status and graduate status in other subject areas (eg in lengths of courses). Third, the route taken may affect the quality of HQTM. In the case of engineers, for example, there seems to be some support for the idea that the pendulum has swung too far in favour of formal higher education routes, with too little industrial contact.

Evidence about the flows of students through the education system lends support to the long-established, but apparently still continuing inflexibility in the choice of subjects. It must be of some concern that students become funnelled into a series of educational motorways with inadequate link-roads. A related problem is the reluctance of female students who, given the present system, choose not to opt for 'A' levels that are essential for studying SET subjects in the higher education system. There is also the question of why girls with appropriate 'A' levels, who exhibit a high probability of taking SET subjects at degree level, opt out of taking engineering. Here, the problem of a lack of accurate information about the nature of the work undertaken by professional engineers may be of crucial importance.

Subject choice is influenced by a wide range of factors. One focus of attention in this paper has been the role of market forces (reflected in starting salaries, rates of return and employment opportunities) in influencing the supply decision. There is some cause for concern whether the traditional market indicators reflect relative market positions of groups with different educational backgrounds. On balance, the empirical evidence seemed to suggest that they did. Nevertheless, there are probably strong grounds for arguing for an improvement in the amount and the quality of information provided to students.

This point again links up with the question of the flexibility of the educational sytem. The difficulty of switching subject areas has already been noted. In addition, further problems of inflexibility arise because students are 'locked in' to courses for long periods of time. Students graduating at the present time will tend to reflect the market position that prevailed three, four, or more years ago, rather than the current situation. A modular system of higher education, with awards based on an accumulation of 'credits', would help students to adapt to market circumstances more easily.

A country with a stock of qualified manpower whose mix of subject areas and expertise is historically determined must seriously consider the need to modify the stock to meet current (and future) demands by retraining. If this problem is dealt with on a continuing basis, a relatively small retraining programme might well cope. Particular attention might be paid to the suggestion of retraining scientists if a shortage of engineers becomes apparent as the economy moves out of recession. There is, however, a potentially more serious problem, concerning the vintage structure of the stock of HQTM. Human capital (ie the embodied stock of skill and knowledge) is no different to physical capital in the sense that, unless it is maintained and refurbished, it becomes obsolete. Continuing education is therefore essential to maintain the quality of the overall stock.

The relatively cyclical nature of the demand for HQTM and the relatively small stock of engineers compared with the number actually in employment, indicated that this group might, of any group, be subject to shortage as the economy picks up. No evidence was found, however, of current shortages. Nor are the foreseeable shortages likely to be of sufficient magnitude to support a radical change in the number of engineers being trained. From the available evidence, it might be anticipated that such shortages could largely be accommodated by substitution from the ranks of scientists or technicians. Extra engineers are costly to train and, if anything, the evidence suggests that they are less flexible in the roles they can fill than scientists (although, it must be admitted that their relative concentration in certain occupations may well reflect their relatively tight labour market position).

One possible caveat to this stance is that we still know too little of the problems caused by the international migration of qualified manpower and the likelihood that they will affect the UK in the future. What we do know is that HQTM form the educational group most affected by such international movements. Judging from the rather heated debate on this subject it would seem fairly easy to defend the view that, although global welfare might be increased by free migration, national welfare can be seriously affected, at least in the short run. The synchronization of the business cycles internationally might well exacerbate shortages in countries experiencing net emigration. In addition, there is a very real danger that the out-going individuals will prove to be of higher quality than those who remain (or, indeed, than those coming into the country).

Many HQTM are employed in occupations and functions where they may use little, if any, of their formal science or engineering education. This may reflect a misallocation of resources, as such knowledge is extremely costly to impart, given the relatively capital intensive nature of education in these subject areas. One possibility might be that, in addition to extending the education of engineers to non-SET subject areas (NEDO p.20; Finniston p.78), individuals who are training in non-SET areas should be given a greater element of science and technology subjects.

Even where HQTM enter professional SET employment, there seems to be a discrepancy between the academic education they receive and the skills and knowledge they require for their jobs. An obvious response is that the education system provides 'general' training (ie equally relevant to any firm likely to employ that type of candidate) which is a prerequisite for undergoing the 'specific' training (ie relevant only to the employing firm) in the skills that firms require. It is an interesting question, however, as to how much of this 'general' training is unnecessary in the adopted career. Employers, both in their attitudes toward a higher vocational element in education and in their expenditures on post-graduation training, seem to be indicating that there is something of a divorce between the nature of the product the education system supplies and the product they would wish to purchase. Under these circumstances, employers are using the education system as a screening device to search for the most able candidates (a very expensive filter mechanism from society's point of view). Some further support for this idea comes from a contradiction in employers' behaviour: they call for an increased practical element in courses and yet they prefer to recruit the most academically able students, who tend to be found in the least vocationally biased courses (CPRS 1980, p.4).

An accumulation of tentative evidence of a variety of types has gradually eroded the view of widespread current shortages of HQTM. Nevertheless, the much more difficult question of whether there are social (as opposed to private) grounds for expanding the employment of HQTM still remains. The Finniston Report, for example, emphasizes the growing evidence of the importance of quality rather than price competition. Clearly, to compete effectively, Britain requires to build a strong technological base (not only in terms of product performance, but also of productivity). Nevertheless, such an argument is not sufficient grounds for justifying government intervention. It must, in some way, be shown that the outcome resulting from employers acting in their own interests differs from (and is inferior to) the outcome that can be achieved in the national interest.

Such a case can be made, but it is more involved than simply arguing the need for a strong technological base and hence the need to increase the supply of engineers. Increasing the supply of manpower does not ensure employment for them (unless we are willing to accept the idea that supply can create its own demand) and there are unlikely to be any positive spin-offs from a larger group of unemployed or underutilized HQTM. This point was brought home by the cut-backs in graduate recruitment during the recession of 1970-72, just at a time when an increased supply of HQTM was coming on stream. A number of commentators have suggested that this experience was damaging to the future supply of students into SET subjects.

A more realistic case might be made on the grounds that firms' demands for HQTM are related to output and profit levels. The latter is particularly important because it is a source of internally generated funds for discretionary investments, of the R&D type, and is particularly susceptible to large, short-term fluctuations. It does not appear to be the ideal situation in which to fund important long-term investment activities (such as R&D) from sources subject to major short-term movements. One reason for intervention, therefore, would be to reduce the large variations in these key functional activities, in order to reap the potentially larger rewards that might be expected from a more stable investment programme.

Firms may be able to do more to stabilize their demands for HQTM (NEDO 1975, p.20), but they live in an inherently cyclical environment which, in turn, influences their demands for labour. It is not so clear that the same constraints apply to government. At a time of economic recession there may be grounds for stringency on the part of the government, but this is not inconsistent with making wise investments for the future. Our brief examination of the government's record in this field suggested little sign of a counter-cyclical element. Indeed, the element of major 'prestigious' projects, often undertaken for political reasons, seems to have added a further and almost wholly capricious dimension. The government particularly needs to plan its intervention in the area of R&D on a more systematic basis, ideally within a framework of a formal science and technology policy.

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4

RESPONSE TO CHANGE IN THE UNITED STATES

by Richard Freeman

The decade of the 1970s was one of significant change in the labour market for college-trained manpower. The once high and in some areas rising economic reward to college-going declined and many recent graduates found themselves with serious labour market problems. Newspaper and magazine articles turned attention to the unemployed teacher, the doctorate taxi driver, the college graduate employed in the factory. Throughout society questions arose regarding the economic value of higher education, motivating such books as my *Overeducated American* (Academic Press, 1976).

The Bureau of Labor Statistics, among others, forecast significant surpluses of college graduates, in sharp contrast to traditional forecasts of shortages. State legislatures, federal agencies, students and their parents reacted to the new realities, placing academic institutions in a very different environment from the one they had enjoyed in previous decades.

Rapid growth of higher education turned into stagnation, and academic institutions were forced into modes of behaviour quite different from those in previous periods of high demand for college education.

The purpose of this essay is to examine evidence regarding the impact of the changed labour market on the higher educational system. Special attention is given to late 1970s developments that were not examined in early studies of the declining college job market. The first section reviews the pattern of change in the market for college-trained workers. It seeks to determine the extent to which the decline in the college job market has decelerated and the extent to which the graduates of the early seventies have recouped their economic position. Then it considers the way the market changes have altered the number of students seeking higher education. The second section turns to the question of the impact of market changes on the higher educational system, and the final section evaluates the ways by which the higher educational system is adjusting to swings in the labour market.

WHAT WE KNOW (OR THINK WE KNOW) ABOUT THE CHANGING LABOUR MARKET FOR COLLEGE EDUCATED WORKERS

A wide variety of evidence on the changing market for college-educated workers has cumulated in the past few years. While there is some disagreement regarding interpretation of the evidence which I first analysed in 1975 and 1976, developments in the latter part of the seventies appear to confirm the basic finding regarding the 'turnaround' in the college job market that differentiated the decade from earlier post-World War II years. In this section, I review the most recent evidence of change in the college job market — the experimental variation which enables us to probe the link between the labour market and higher education — in order to assess the dimensions of changes. The most important findings which emerge from this analysis can be summarized in four basic propositions which constitute what we 'know' about the changing labour market:

1 The labour market for the highly educated underwent a marked downturn in the decade, which substantially reduced the relative earnings of new college graduates and which forced many into jobs not normally viewed as requiring college training. Measured as a rate of return, the return to four years of college fell from perhaps 11 to 7 per cent. While the decline in the economic opportunities for college workers decelerated or improved slightly at the end of the 1970s, there is no indication of a recovery of previous economic advantages by that time.

2 The downturn differentially affected fields, being most severe in liberal arts, teaching, academic and research oriented occupations. The downturn was more severe at the doctorate level than at other levels. By contrast, in certain business-oriented fields, such as management and accounting, in engineering, and in selected other specialities, economic opportunities remained substantial or in some cases improved contrary to the overall pattern.

3 There was a significant supply response to the market turnaround, with the proportion of young persons enrolling in college levelling off for some groups and actually falling sharply for white males. Both statistical and survey questionnaire data indicate that the changed enrolments reflect an economic responsiveness of potential students to market incentives.

4 Consistent with the pattern of change in earnings and opportunities across fields, there was considerable variation in changes in enrolments and degrees. Fields with depressed job markets like teaching experienced rapid declines in enrolments while those with opposite markets like engineering had large increases. Professional schools benefited, while arts and sciences suffered from the labour-market induced patterns of change in enrolment.

All told, the labour market for college-trained workers underwent extraordinary change in the 1970s, with significant implications for higher educational institutions.

I consider next the evidence for the four propositions, contrasting where relevant the patterns in the latter half of the decade with those in the 1969-75 period on which my earlier work focused.

1 The Overall Decline

The evidence that the labour market for the highly educated, especially new college graduates, underwent a major, unprecedented downturn in the 1970s is impressive. Statistics on incomes and starting pay show a marked deterioration in the economic status of graduates *relative* to other workers, while data on employment shows an increasing number of college graduates ending up in positions outside traditional college-level job areas.

Table 4.1 summarizes data on the overall pattern of change in the earnings of college graduates. It compares several measures of the earnings of college graduates relative to the earnings of other workers from 1969, when the college market place was strong, to 1974 when it was substantially depressed, and then to 1978-1980. To minimize the impact of cyclic changes on the comparisons, the data relate to the earnings of year-round full-time workers and actual monthly salary rates. Annual income figures which include the income of those without work for part of the year show similar patterns.

The table shows a sizeable drop in the relative position of the highly educated during the period under study, especially among the young. From 1969 to 1974 the income of 25-34 year-old male college graduates relative to high school graduates dropped sharply, then rose modestly over the next four years, when the Current Population Survey underwent a modest change in methodology. For all men the pattern is similar, with an income ratio of 1.53 falling to 1.35 and then rising somewhat to 1.40. For women, the pattern is quite different, but still evinces a declining advantage to the college-trained. For 25-34 year-olds there is a sharp drop from 1969 to 1974, followed by a slight decline thereafter, whereas for all women income ratios are steady from 1969 to 1974, but appear to fall in the latter part of the decade.

The pattern of falling relative income of college workers is also found in the ratio of starting salaries of graduates to average annual earnings shown in lines 5 and 6 of the table, which shows the bulk of the drop occurring in the early 1970s and some upturn in the latter part of the decade.

Overall, we see that while there is some indication of a modest recovery in the college market from the severely depressed conditions in 1974, the recovery is insufficient to come even close to restoring the earlier income advantage of graduates. The market was depressed for graduate manpower throughout the decade following the heralded turnaround.

Parallel to the drop in the relative income of college students was a deterioration in employment opportunities. This deterioration forced an unprecedented number of college graduates, particularly those starting their careers, into non-professional jobs, jobs outside their areas of study, or into unemployment.

Table 4.2 examines this aspect of the changing college job market. It compares the types of jobs and difficulties in obtaining positions in 1969 with the situation in 1975 and in 1979. Lines 1 and 2, which give the most comprehensive statistics on the employment of graduates, show that the proportion employed in the traditional occupational area of the college-educated, the professions, fell sharply in the period, by 9 percentage points for men and 16 percentage points for women.

Table 4.1 College to high school income ratios 1969-81

		1969	*1974*	*1978-81*
Income of full-time year round workers with four years of college to income of full-time year round workers with four years of high school				
1	Men 25-34	1.39	1.16[a] 1.20	1.22[a]
2	All Men	1.53	1.35[a] 1.36	1.40[a]
3	Women 25-34	1.42	1.29[a]	1.26[a]
4	All Women	1.36	1.35[a]	1.28[a]
Starting salaries of college men working in industry to average annual earnings				
5	Bachelor's	1.24	1.09	1.05[b]
6	Doctorate	2.18	1.78	1.87[c]

[a] Figures in 1974 in the first row are based on old imputation procedure. Those in second row are based on new imputation procedure, as are figures for later years

[b] 1979

[c] 1980/81 average annual earnings estimated from 1978 data in *US Statistical Abstract, 1980* Table 701, by applying percentage change in hourly earnings in total private industry from *Employment and Earnings* Jan. 1981, Table c-1

Source: Lines 1-4: Current Population Survey, Consumer Income Series P-60, various editions.
Lines 5-6: Bachelor's from *Endicott Report*, various editions, using a reported average of salaries with weights .05 accounting, .35 engineering, .40 sales, .20 general business trainees; Doctorate, unweighted average from College Placement Council series. Earnings, elsewhere, from US Department of Commerce *Survey of Current Business* National Income editions.

Table 4.2 Measures of the employment opportunities of college workers 1969-1979

		1969	*1975*	*1979*	*1969-79 Change in percentage points*
1	Proportion of workers with 4 or more years of college in professional jobs: Males	.61	.54	.52	- .09
2	Proportion of workers with 4 or more years of college in professional jobs: Females	.81	.70	.65	- .16
		1962-68	*1969-76*		*1976-79*
3	Ratio of additional college graduates in professional jobs to additional college graduates	.73	.46		.44

Source: Lines 1, 2: US Department of Labor *Educational Attainment of Workers* March 1969 (Special Labor Force Report 125, Table I, p.A-28) and Special Labor Force Report 186, table I, p.A-19, and Special Labor Force Report 240, table 5, p.A-19).
Line 3: US National Center for Education Statistics *Condition of Education* 1979, table 1.11, updated.

The data on employment of college graduates is organized in line 3 in a different fashion to focus on the likely occupations of the new cohorts of graduates. From 1962 to 1968, the number of college graduates in the labour force grew by 4,017,000. The number obtaining professional jobs grew by 2,915,000 — implying that 73 per cent of the additional college workers got professional employment. From 1969 to 1976, by contrast, when the number of graduates grew by 8,096,000, the number obtaining professional jobs grew by just 3,751,000 — a 46 per cent rate of increased employment in the professions. From 1976 to 1979, the number of graduates increased by 3,706, 208, while the number working as professionals increased by 1,627,000 — a 44 per cent rate of increased employment in the professions. As in earlier calculations, we find a dramatic change from the 1960s to the 1970s, with the rate of deterioration lessening; in this case, levelling off in the late 1970s.

Table 4.3 Changes in the cost of college and in the ratio of costs to benefits of college 1949-78 (all in 1967 constant $)

	1949	*1961*	*1969*	*1974*	*1978*	*% Change 69-78*
1 Cost of higher education						
a Tuition & fees, public	153	248	295	341	284	- 3.8
b Tuition & fees, private	655	1011	1397	1550	1429	2.3
c Total cost/pupil (current-fund expends/degree-credit enrolments)	1182	1995	2686	3411	2628	- 2.2
2 Earnings of men 25-34						
a college grad	5773	8334	9815	8350	8364 *	- 14.8
b high school	4546	5979	7407	7267	6925 *	- 6.5
c difference	1227	2365	2708	1083	1440	- 40.0

*Adjusted for comparability with earlier surveys using figures in Freeman 1980, Table 1

Source: Lines 1a-b: 1969, 1974 from US Office of Education *Projections of Educational Statistics to 1984-85* 1975 ed., p.106.
1961, from US Office of Education *Projections of Educational Statistics to 1978-79* 1969 ed., Table 50, p.107.
1949, from National Science Foundation *Statistical Handbook of Science and Education* (NSF 60-13) Figure 48, p.51.
Line 1c: US Office of Education *Digest of Educational Statistics, 1975* Table 92. Obtained by dividing current fund expenditures by resident degree credit enrolment, updated with data from *Digest of Educational Statistics, 1980.*
Line 2: US Bureau of the Census *Current Population Reports* Consumer Income Series P-60 No. 92, Table 1. With ungrouped data adjusted by ratio of ungrouped means in 1967. No. 75, Tables 47, 58, and 101. No. 123, Table 50.
US Dept. of Commerce *Trends in the Income of Families and Persons in the US* Technical paper 8, Table 3.
1949 earnings from H.P. Miller (1960) Annual and lifetime income in relation to education: 1939-1959 *AER* (Dec. 1960) Table 1.

Rates of Return The decline in the economic position of college workers in the 1970s was accompanied by continued rises in the direct cost of education, with the necessary consequence that the rate of return to investment in college fell. Table 4.3 compares costs of training with the income rewards accruing to young (25-34 year-old) male graduates. For historic perspective, the table covers a longer period than Tables 4.1 and 4.2; and for comparability of incomes over time, it deals with the income of all workers rather than that of year-round full-time workers. Lines 1(a) to 1(c) show a rough stability/modest increase in the real cost of college in the 1970s, with tuition and fees in public colleges falling by 3.8 per cent, tuition and fees in private institutions rising by 2 per cent and total cost per pupil decreasing by 2 per cent in the 1969-78 period. Lines 2(a) to 2(c) turn to the benefit side of the picture. They record the differences between the income of college and high school graduates. Consistent with the picture in Table 4.1, the data reveal a marked drop in the absolute real differential between young male college and high school workers in the period. Whereas in 1969, 25-34 year-old college men earned $2708 more than similarly aged high school graduates, in 1978 their advantage was just $1440, a striking 40 per cent decline. Note, however, that in these comparisons as in the others, the bulk of declines occurred in the early part of the decade, with the position of young male college graduates improving somewhat after the mid-1970s.

The way in which these changes affect rates of return depend on assumptions about future income profiles. If the college graduates of 1970s are on permanently lower trajectories than has traditionally been the case, the return to their investment will be lower than if they manage to recoup at least some of the relative income losses of the period. In their critique of my analysis, Smith and Welch argued that college graduates are, in fact, likely to make some relative gains in the future, which implies that the analyses based on starting salaries of the earnings of young college graduates exaggerate the magnitude of changes. Sufficient time has progressed to allow for some evaluation of this possibility. To what extent, if any, have the graduates of the early seventies experienced especially rapid rates of growth in earnings, which would enable them to recoup traditional college earnings differentials over the life cycle?

Three studies have dealt with this question. One, by Marc Berger, has found that the college graduates in the Current Population Survey and the National Longitudinal Survey ('Parnes' data set) had *slower* rather than faster rates of increase in salaries over the period. A second, by Donovan and Raisan, found that in the Michigan Panel Survey of Income Dynamics college graduates had slower rates of growth by about one and a half percentage points per year than high school graduates, but that the rates of growth grew closer together toward the latter seventies. My own work, comparing cohorts in the Current Population Survey also finds slower growth in the earnings of college men over the period. All of these studies suggest that, if anything, the diminution in the advantage of young college graduates shown in Tables 4.1 and 4.3 understates the possible lifetime income loss of the seventies graduates. While the evidence suggests that the bulk of the turnaround has occurred, it does not support the notion that the seventies graduates are recouping their economic loss over the life cycle. We conclude that the developments of the 1970s have caused a *real* economic loss.

2 *Variation Among Fields*

One of the basic features of the declining college market of the 1970s has been the vastly different experience of diverse fields and degrees. Generally speaking, the pattern has been of exceptional decline in academic and research fields in contrast to more modest decline or increases in business-oriented occupations like business, engineering, and medicine.

Table 4.4 documents the differential pattern of change in salaries. The figures on Bachelor's starting rates show sizeable variation in the rate of decline in the real starting pay of college men from 1969 to 1975 and from 1975 to 1981. Humanities and social science majors experience a loss in real starting pay of 20 per cent in the first period and of 11 per cent in the second period. Accountants and general business graduates did somewhat less poorly, while chemists and mathematicians have smaller rates of decline and hold their own or gain in the 1975-1981 period. Engineers do the best, particularly in the latter part of the decade. As a result of the changes in 1969, the ratio of the starting pay of BS engineers to that of Bachelor's humanities and social science majors was 1.23; in 1981, it was 1.64!

The rates of change for PhDs and Master's graduates tell a similar story about the locus of the decline by the degree level and field. On average, from 1970 to 1981, PhD and Master's starting pay fell by nearly 20 per cent. Within the same field, the salary of doctorate and Masters personnel declines more rapidly than that of Bachelor's graduates, save for MBAs, where the rates of change were similar. The especially large drop in the real pay of PhD and MA or MS workers significantly cut their premium over Bachelor's graduates and thus lowered the rate of return to postgraduate training. In 1970, a PhD engineer earned 57 per cent and a MS engineer 17 per cent more than a BS engineer in the specialty. In 1981, the advantage to the PhD or MS had fallen to 40 per cent and 10 per cent respectively. Across fields, engineering and to a lesser extent chemistry did relatively well toward the end of the decade.

Finally, information on the types of jobs obtained and difficulties in finding positions by field of study tell a similar story about patterns of change across fields. According to the surveys of the National Education Association, elementary and high school teaching was one of the most depressed fields, with the proportion of new education graduates obtaining teaching jobs dropping from 74 per cent in 1962 to 48 per cent in 1974 (NEA 1977). In February 1978, when 5.9 per cent of all 1976-77 Bachelor's recipients were unemployed, the rate for arts and science graduates stood at 7.9 per cent with a 9.5 per cent rate for humanities majors and 11.4 per cent for BS biological scientists (National Center for Educational Statistics, *Condition of Education*, 1979).

Table 4.4 Average monthly salary offers to college graduates from business

	Current dollar salaries[b]			*Percentage change in constant 1967$*[c]	
	1969-70	*1974-75*	*1980-81*	*1970-75*	*1975-81*
Bachelor's					
Business:					
Accounting	836	980	1413	- 16	- 11
General	721	847	1329	- 15	- 4
Engineering[a]	864	1116	1880	- 7	3
Humanities and Social Sciences	700	781	1144	- 20	- 11
Chemistry	825	962	1572	- 16	0
Mathematics	794	924	1574	- 16	4
Computer Science	–	977	1664	–	4
Master's					
MBA (after non-technical under-graduate degree)	1044	1250	1906	- 14	- 7
Engineering[a]	1007	1246	2072	- 11	1
Chemistry	978	1118	2028	- 16	11
Mathematics	959	1138	1828	- 15	- 2
Computer Science	–	1169	1981	–	3
Doctorate					
Engineering[a]	1353	1550	2639	- 18	4
Chemistry	1278	1503	2393	- 15	- 3
Mathematics	1421	1523	2446	- 23	- 2

[a] Unweighted average of all fields

[b] 1969-70 and 1974-75 figures for BAs relate to males; 1980-81 figures relate to men and women. 1969-70 figures for Master's and Doctorates relate to men; later figures relate to men and women

[c] Deflator: 1969-70 116.3; 1974-75 161.2; 1980-81 264.9 (Source overleaf)

Source: *Digest of Educational Statistics* 1972, p.144, table 153-154.
The Condition of Education 1979 p.208, table 5.17.
CPS Salary Survey March 1981.
Digest of Educational Statistics 1973, p.179.

The drastically different markets for various disciplines has not escaped the attention of college placement officers, who note: '. . . what's bad is getting worse . . . in general the market in technical areas has been the best that it's been in years . . . (whereas) for the kid coming out of a general studies background the market is flat.' In spring 1981 the New York Times summarized the pattern: 'Engineers are being hungrily wooed with salary offers reaching $30,000 a year, while liberal arts majors are scraping to find opening that pay $12,000.'

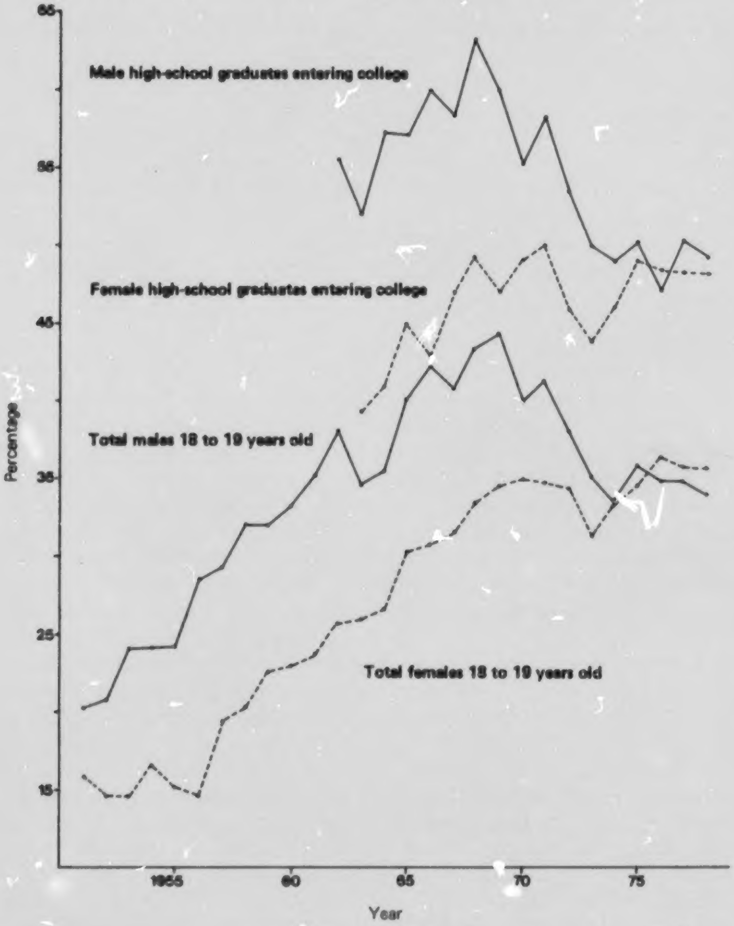
We conclude that the downturn in the college market place was substantially concentrated in certain areas and in certain types of degrees as opposed to others.

3 Enrolment Response

The impact of the changing labour market for college graduates on the higher educational system depends in large part on the supply responsiveness of young persons to the decline in incentives. Figure 4.1 presents data on the enrolment behaviour of young persons in the changing college market. It depicts the proportion of 18 to 19 year-olds enrolled in college from 1951 to 1979 and the percentage from specific high school graduating classes enrolled as freshmen in the following year. What stands out in the data is the sudden sharp fall in the relative number of male college students, which began in 1969 (1968 in the high school graduate data), when the labour market turned down after more than a decade of substantial increase. In 1969, 44.0 per cent of 18 to 19 year-old male *civilians* enrolled in college, and 60 per cent of new high school male graduates elected to become freshmen (down from 63 per cent in 1968). Five years later, just 33.4 per cent of 18 to 19 year-old males and 49 per cent of male high school graduates went on to college — remarkable declines of 10.6 and 11 percentage points. Ten years later, the figures are similar, 33.3 per cent of 18 to 19 year-old males enrolled in college and 50 per cent of male high school graduates entered college. Consistent with our findings about the time pattern of change in relative earnings and employment, the bulk of the drop in the enrolment proportions occurred in the first half of the decade, stabilizing thereafter.

Among women, Figure 4.1 shows a somewhat different story. Here, enrolment rates level off in the 1970s but do not decline. In 1969 34.4 per cent of women aged 18 to 19 enrolled in college; in 1974 33 per cent; and in 1979 36 per cent. The proportion of female high school graduates going on to college remained roughly stable over the same period (47 per cent in 1969, 46 per cent in 1974 and 48 per cent in 1979). As a result of the decreasing proportion of young men going on to college and the stability in the

Figure 4.1 Proportion of young men and women enrolled in college 1951-1979



Source: US Bureau of the Census (1950-79) School enrolment *Current Population Reports* Series P-20; various editions; US Bureau of Labor Statistics *Employment of High School Graduates and Dropouts* Special Labor Force Reports proportion of young women, the female share of entering students rose sharply in the period. In 1979, women constituted 52 per cent of 18 to 19 year-olds in college compared to 46 per cent in 1969. The stability in female college enrolment compared to the drop in male enrolments is, it should be noted, consistent with the data on relative economic rewards which suggested that the payoff to female college-going did not decline as quickly or consistently as did that for male college-going in the seventies.

Was the decline in the proportion of young persons going to college concentrated among persons from less advantaged backgrounds or did it occur more evenly among those from high as well as low or middle income families? Surprisingly, perhaps, US Bureau of Census evidence shows relatively little decline in college-going among persons from very low income families and roughly comparable declines among those from families above the lowest level as given in Table 4.5.

Table 4.5 Percentage enrolled of dependent family members, 18-24 year-olds

1970		*1979*	
Family Income $	*Per cent Enrolled*	*Family Income $*	*Per cent Enrolled*
0 – 2 999	13.7	0 – 4 999	12.1
3 000 – 4 999	19.6	5 000 – 9 999	14.7
5 000 – 6 999	29.5	10 000 – 14 999	16.1
7 000 – 9 999	37.4	15 000 – 19 999	22.7
10 000 – 14 999	45.7	20 000 – 24 999	28.2
15 000+	59.8	25 000 +	46.0

Source: US Bureau of the Census *Current Population Report* p.20, No. 222, Fig. 1, No. 360, Table 13

The fall in enrolments from the middle and upper classes represents a major change in the traditional pattern of intergenerational mobility: for the first time, large numbers of young persons appeared likely to obtain less schooling and potentially lower occupational status than their parents.

At the graduate level, the drop in the proportion of young persons from the relevant supply group — those with college degrees — choosing to enroll for graduate work had fallen equally sharply. This development is examined in Table 4.6, which presents two sets of figures on graduate enrolments — Office of Education data, based on surveys of institutions of higher education, and Bureau of the Census data, which are obtained from the Current Population Survey of individuals. Lines 1 and 2 record the absolute number enrolled in graduate programmes in 1969, when the market was still strong, and in 1975, after several years of downturn. Line 3 gives estimates of the relevant population which could be expected to go on to graduate studies: college graduates aged 22 to 29; while line 4 and 5 present the estimated 'propensity to enroll for graduate work', defined as the ratio of the figures in lines 1 and 2 to those in line 3. According to the statistics, the absolute numbers pursuing graduate work increased moderately from 1969 to 1975, but much less rapidly than did the relevant population of eligibles, substantially reducing the proportion enrolled. From 1975 to 1979, the rate of enrolment appears to have levelled off. For 1979 the Office of Education data show 34 per cent of 22 to 29 year-old graduates were enrolled in graduate/professional schools compared with 42 per cent a decade earlier, while the Bureau of Census data show 40 per cent enrolled compared with 50 per cent a decade earlier.

Table 4.6 Changes in the proportions of persons going for graduate education

		1969	*1975*	*1979*	*% Change 1969-79*	*% Change 1975-79*
1	Number enrolled for graduate work (OE) (in thousands)	955	1263	1457	32.2	5.4
2	Number enrolled for 5 or more years (Census)	1138	1590	1691	39.6	6.4
3	Number of 22-29 year-olds with 4 years of college	2281	3932	4280	72.4	8.8
4	(1) / (3)	41.9	32.1	34.0	- 23.4	5.9
5	(2) / (3)	49.9	40.4	39.5	- 19.0	- 2.2

Source: Line 1: National Center for Education Statistics *Projections of Education Statistics to 1986-8* Table 9 (1979 an estimated figure).
Line 2: US Bureau of the Census *Current Population Reports* series P-20, 266, 303, 360 Table 3.
Line 3: Series P-20, Table 1, 194, 295, 356, Table 1.

Interpretation An economist finds it natural to link the changes in the job market documented under proposition 1 with the observed changes in enrolments examined here in terms of the *labour supply behaviour* of potential students and their families. Two very different types of evidence support this interpretation. First, survey evidence on the reasons young people give for going to college find earnings or job opportunities high on the list, which suggests considerable supply responsiveness. Nearly 80 per cent of freshmen surveyed by the American Council of Education in 1977 agreed, for example, that a major reason for going to college was that it would enable them to get a better job. Nearly one-third cited 'able to make more money' as a very important reason for going to college. Similar results are obtained with questions relating to choice of career. Second, econometric analysis indicates that the income of graduates relative to other workers and/or measures of relative employment opportunities does a good job in tracking actual patterns of enrolment over time. Most other factors which might be cited as explanations of the observed changes — such as the draft, cyclical unemployment, inflationary cuts in real family income, do not account for the observed changes.

How important are changes in the propensity of students to enroll in college due, it appears, to economic incentives in the changing number going to college? Despite the great emphasis placed in recent discussion of enrolment on demographic developments, market-induced changes in the proportion choosing to enroll have been extremely important. For example, from 1970 to 1979 enrolment of men aged 18-19 in college fell by 5000 whereas the 18-19 year-old male population increased by 843,000 (Bureau of the Census, Series P-20). The dominant factor in the change was the change in propensity to enroll, not the change in the size of the population. While the importance of changes in enrolment propensities in altering flows of students will vary with market conditions, group and time period, it is apparent that one of the critical aspects of the labour market - higher education linkage is the supply responsiveness of the young.

4 Enrolments in Different Fields

There is a sizeable body of evidence supporting proposition 4 — that the changing market place for college workers affects not only the overall decision to enroll but also the field of study chosen. In the 1970s the differential change in the income and employment conditions in the various college-level occupations appears to have generated a significant supply response from young persons in the process of choosing their careers. As would be expected of economically responsive decision-makers, students shifted from fields facing the worst market conditions to those with relatively better prospects.

Table 4.7 documents the overall pattern of change in the career plans of entering freshmen. What stands out in the table is the remarkable shift of both men and women from academic to business-oriented fields, which would be expected if students were responding to the differential incentives described earlier. Whereas in 1966, 2.1 per cent of men and 1.5 per cent of women planned to teach in colleges and 11.3 per cent of men and 34.1 per cent of women planned to teach in elementary and secondary school, in 1979, just 0.3 per cent of male freshmen and 0.2 per cent of females intended on college teaching and just 2.7 per cent (male) and 10.4 per cent (female) considered elementary or secondary school teaching. The proportion of both groups intending business careers rose over the entire period, by nearly sevenfold among women; while the proportion of men intending to enter engineering fell from 1966 to 1974, then rose again from 1974 to 1979.

Table 4.7 Distribution of freshmen by probable career occupations

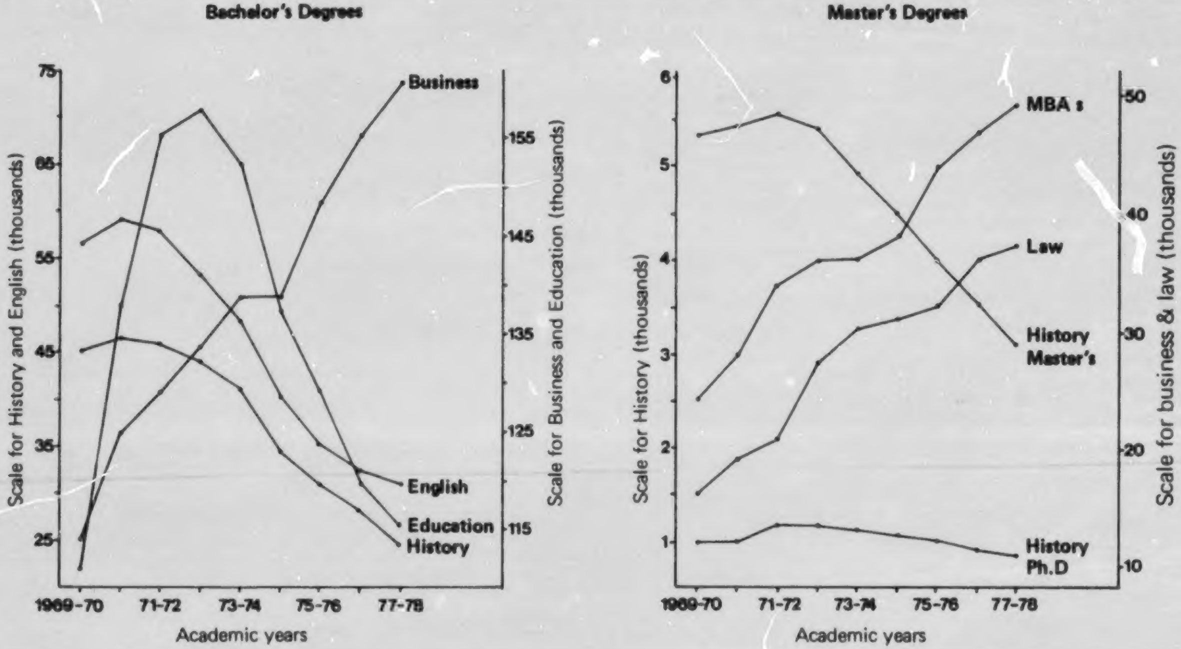
	Males			*Females*		
	1966	*1974*	*1979*	*1966*	*1974*	*1979*
Business	18.5	17.6	23.4	3.3	8.5	20.8
College professor	2.1	0.7	.3	1.5	0.8	.2
Doctor	7.4	6.9	5.2	1.7	3.5	3.5
Elementary, secondary teacher	11.3	3.8	2.7	34.1	11.9	10.4
Engineer	16.3	8.5	16.8	0.2	0.8	2.3
Farmer	3.2	6.2	3.8	0.2	1.3	1.2
Health profession (Incl. nursing)	3.2	5.8	2.0	11.9	22.7	9.2
Lawyer	6.7	5.3	5.0	0.7	2.3	3.4
Scientist	4.9	2.7	2.4	1.9	1.4	1.3
Other	21.6	30.2	29.0	40.7	34.2	36.3
Undecided	5.0	12.3	9.4	3.6	12.6	11.4

Source: American Council on Education *The American Freshmen: National Norms for Fall 1974, 1979. National Norms for Entering College Freshmen, Fall 1966.*

The enrolment and degree data in Figure 4.2 provies further evidence of the striking changes experienced by diverse fields in the period:

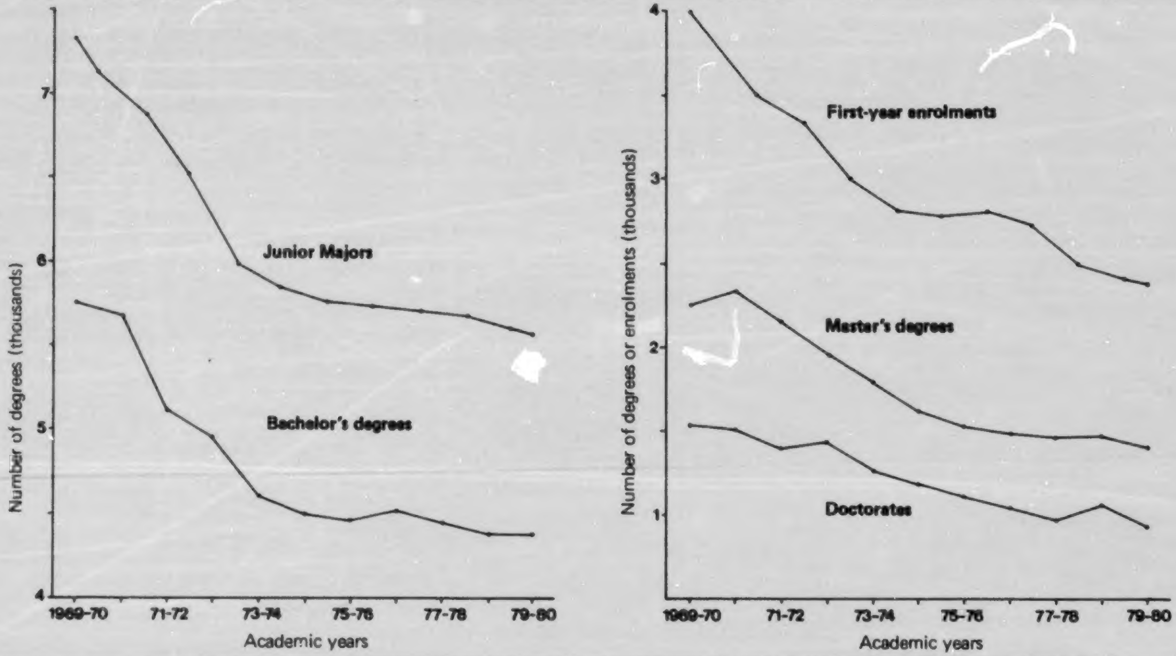
- In the hard hit education area, the number of Bachelor's degrees fell by 19 per cent in the 1970-1978 period.
- In physics, whose job market turned down earlier than in other fields, despite a two-fold increase in the total student body, junior and senior majors declined from 14,900 (1961) to 10,900 (1971) and first-year graduate enrolments by over one half.
- In fields with stronger job markets, life sciences, agriculture and business-oriented specialties, by contrast, degrees increased. The

Figure 4.2 Bachelor's degrees and Master's degrees



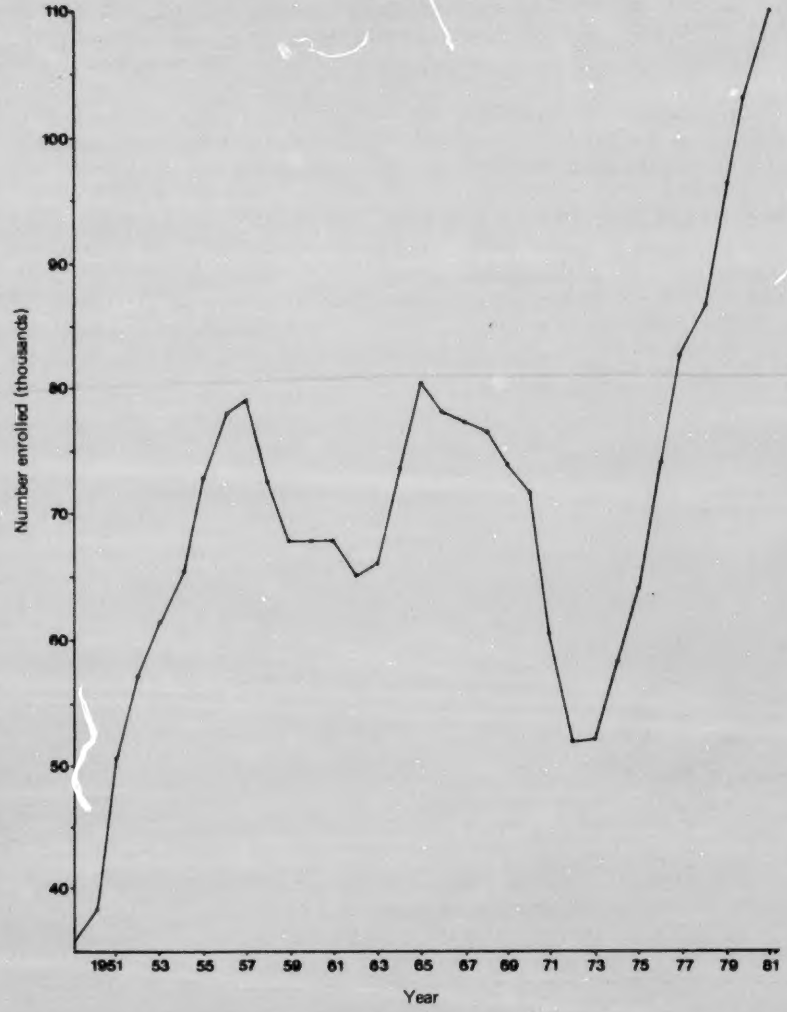
Source: National center for Educational Statistics

Figure 4.2 (continued) Physics enrolments and degrees awarded by academic year, 1969-80



Source: The American Institute of Physics

Figure 4.2 (continued) First-year enrolments in engineering



Source: American Association of Engineering Societies number of MBAs, for example, grew greatly from 1970 to 1978.

— Perhaps most impressive in terms of the differential pattern of changes among fields is engineering, which throughout the late 1960s and early 1970s had substantially declining enrolments. From 1973 to 1979, first year enrolments in BS engineering, which had in 1973 plummeted to its lowest figure since 1949, despite the expansion of higher education, rose by about 50,000 in accord with the cobweb dynamics that seem to characterize that field.

Econometric evidence relating the number of students enrolled or graduating in various fields to salaries in those disciplines and to salaries in alternative professions confirm the economic responsiveness interpretation of the patterns. While precise estimates depend on the specification of models, years covered, and measures of variables, the general finding is that salaries have a significant and large impact on supply decisions. Table 4.8 summarizes some of the relevant estimates of elasticities for particular fields and for all freshmen in college. Column 1 gives estimates of the 'short run' effect of salaries, where short run relates to the response in a given year.

Table 4.8 Some estimates of the elasticity of supply of students to diverse fields

	Elasticity of supply with respect to salaries	
	Short run	*Long run*
Law	0.95	2.79
Physics: BS	2.96	3.72
MS	0.93	2.82
PhD	.82	4.83
MBA	0.96	3.20
Engineering: BS	1.82	3.25
Biology: PhD	1.05	2.77

Source: Law, Freeman (1975a) table 2, line 4.
Physics, Freeman (1975b), table 4, lines 4-6
MBA, Freeman (1976a), p.134, footnote 34.
Engineering, Freeman (1976a), table 4, line 3.
Biology, Freeman (1975c), unpublished report to National Academy of Sciences, table 15, line 5.

Column 2 gives estimated 'long run' elasticities, generally calculated from a partial adjustment model. Because the models and parameter estimates are crude and subject to change given more detailed specification or new observations, the calculations are to be viewed as providing orders of magnitude of the behavioural relations. The elasticities for specific fields range from 1 to 2 in the short run and from 3 to 4 in the long run.

Even more striking, perhaps, is the remarkable difference in the accuracy of projections of future degrees in fields based on supply responsive behaviour and projections based on traditional trend forecasts. In the case of physics (Table 4.9), forecasts based on economic responsiveness have predicted the decline in PhDs granted in physics coming within 10 per cent or so of the actual number granted, after allowances for increased numbers of foreign students whose behaviour would reflect opportunities in their country and other factors unrelated to the state of the US market for physicists. By contrast, trends forecasts have been way off the mark.

Table 4.9 PhDs granted in physics

	Actual	*Actual: adjusted for foreign students*	*Supply response model*	*Trend Forecasts*		
				Office of Education	*Carter*	*NAS-NRC*
1969-70	1500	1500	1500	1500	1500	1500
1974-75	1133	1133	1189	2153	1853	2153
1979-80	885	843	786	2492	2654	3350

Source: See Freeman (1975b). Actual from American Institute of Physics: adjusted for increases in foreign students from 18% of Physics PhDs in 1970 to 1975 to 25% by 1980, as reported in National Research Council data.

All told, the evidence on incomes and employment by field and on the pattern of student enrolments provides strong support for the proposition that the overall decline in the job market for college workers had very different effects on different disciplines.

Summary

Our examination of data on the changing job market for college-trained workers in the US has supported the four propositions with which we began. There was a marked decline in the market for college workers which, while lessening at the end of the decade, did not restore traditional college advantages. There were sizeable differences in the experience of various fields in the period which greatly exacerbated differences between academic and research occupations and business occupations. There was a decline in the propensity to attend college, apparently due to changed economic incentives. There was a differential enrolment and degree pattern among fields, apparently due to their different market conditions.

How did the higher educational system respond to those developments? What are the mechanisms by which colleges and universities react to labour market induced changes in the behaviour of young persons?

The remainder of this essay turns to these important questions.

IMPACT ON HIGHER EDUCATION

The way in which the 1970s turnaround in the college labour market affects higher education depends on the operation of the education market place. The purpose of this section is to examine this market and to analyse the adjustment made by higher educational institutions to the changes of the seventies. Because American higher education is highly decentralized, with over 3000 colleges and universities competing for students, the sector can, with due allowance for its distinct features, be fruitfully analysed in terms of the standard economic model of a competitive industry. The standard model directs attention to the exit and entry of institutions, changes in prices of output, changes in profits and changes in prices paid factors specific to an industry, and changes in product mix, among other things. In this section I consider briefly certain distinct characteristics of higher education likely to affect these and related modes of adjustment, and then examine the changes in the period under study.

Distinctive Features of Academia

The characteristics of higher education most likely to affect the operation of the market place are: non-profit status of enterprises; the relatively small role played by the direct price, tuition, in the cost of education and in the income of colleges and universities; the extensive employment of highly educated workers 'produced' within the system; and institutional rules which limit variation in prices and certain forms of adjustment to change.

The non-profit status of colleges and universities can be expected to affect the response of higher education to market developments. While it is often asserted that non-profit enterprises are less responsive to economic incentives than comparable profit-seeking firms, a simple model of non-profit behaviour can be developed to show that the contrary is more likely. Essentially this is because such enterprises lack the 'buffer' of profits, and thus have to adjust to changes in market conditions entirely through changes in resource usage whereas at least some of the adjustment of profit-seeking firms will take the form of changes in profits. If this argument (given in detail in Freeman 1975, 1980) has at least some validity, we would expect considerable adjustment in the academic market to the seventies turnaround.

In contrast to most goods, whose price is the major component of cost to purchasers and the major receipt of income by sellers, the direct cost of higher education — tuition (and room and board) — constitutes only a modest share of the cost to students and of the income of institutions. On the student side, as Schultz (1963) argued years ago, the bulk of the cost of higher education consists of governmental funds and, in the case of private schools, endowment and gifts.

Table 4.10 Tuition and room and board as a share of cost and expenditures in the academic market 1978

		All Institutions	*Private*
A	*As Component of Cost*		
1	Average tuition and fees	1 015	2 793
2	Room and board	1 505	1 684
3	Estimated foregone income	7 877	7 877
4	Total cost:		
	a without room and board	9 382	10 670
	b with room and board	10 397	12 354
5	Ratio of (1) to (4a)	.11	.26
6	Ratio of (1) + (2) to (4b)	.24	.36
B	*Relative to Expenditures*		
7	Student education expenditures net of scholarship and fellowships (in thousands)	24 824	7 352
8	Total expenditures	45 971	15 245
9	Tuition and fees	9 855	5 713
10	Ratio of (9) to (7)	.40	.78
11	Ratio of (9) to (8)	.21	.37

Source: Lines 1, 2: estimated as weighted average of private and public institutions with .78 weight on public and .22 on private, using data in Table 3.5, p.110 of *Condition of Education 1980* for weight and Table 4.6, p.158 for costs.
Line 3: estimated as three-quarters of the total money income of year-round full-time workers from *Current Population Survey* Series P-60, 123.
Line 7: *Condition of Education 1980* Table 4.2, p.150.
Line 8: *Condition of Education 1980* Table 4.5, p.156.

Table 4.10 documents these two important characteristics of the academic market place at the end of the 1970s. Panel A shows that in all institutions tuition constituted just 11 per cent of the total cost of higher education (with room and board excluded) while tuition and room and board constituted 24 per cent of the total cost. Even in private institutions, no more than 36 per cent of the cost of higher education is attributed to the direct cost. Foregone income is the prime private cost in both cases. Panel B (based on a different but roughly consistent data source) shows that tuition constituted 40 per cent of money spent on the education of students but just 21 per cent of total university income. In private institutions, however, most of the student education expenditure was paid for by tuition, though tuition constituted only 37 per cent of total private institutional receipts.

The low share of direct cost in the private cost of higher education suggests that demand for higher education will be only modestly responsive to changes in tuition (and room and board) charges. Empirical analysis supports the implication. The seven studies cited by McPherson (1978, p.181) show an elasticity of enrolments to tuition of about 0.3 on average. The 0.3 estimate is, it should be noted, roughly consistent with estimates of responsiveness of enrolments to the salaries of college and high school graduates. Elasticities with respect to salaries are in the order of 2.00; given a tuition share in cost of 0.15, one would expect, if tuition was not a serious bottleneck due to problems of capital-financing, an elasticity of 0.3, roughly the McPherson summary estimate. Such a highly inelastic demand for higher education has one obvious implication for policy makers: colleges and universities *as a group* could raise receipts by increasing tuition charges. However, because tuition constitutes only a modest share of receipts, even sizeable increases in tuition will not greatly raise total receipts. In addition, individual institutions are unlikely to exploit an inelastic demand curve, for as in other markets with many competing institutions, demand for the output of a given institution will be much more elastic than demand for the industry's output.

The production of the major input used in higher education, doctorate faculty, and the dependence of the demand for *new* faculty on changes in enrolment suggest application of capital goods accelerator models to the faculty market. Such models highlight the dynamic adjustment problems of an industry producing and employing a long-lived capital resource such as faculty and its potential for cyclic adjustment. For present purposes what is important is that a *deceleration* in the rate of growth of enrolments is likely to have a significant depressant effect on the demand for new PhDs, which in turn can be expected to reduce demand for graduate training, with further negative effects on demand for faculty. Since PhD faculty are highly specialized — in some respects a resource *specific* to the industry — fluctuations in demand for faculty and thus in employment and salaries are likely to be sizeable in response to changes in demand for higher education.

Three institutional features of the academic market are likely to affect the adjustment to changed economic conditions. The general goal of inter-field 'equity' in salaries — defined in terms of making cross-field differences as small as is feasible given the need to obtain faculty — tends to limit the ability of higher education to adjust cross-field rates of pay to changes in market conditions. For example, from 1970 to 1975, when the market for various disciplines changed immensely, the standard deviation of the log change of the salaries of academic doctorate scientists across fields was 0.089 while the comparable standard deviation across fields in industry was 0.385 (Freeman 1979, p.73). The lack of variation suggests that most adjustments across disciplines will take the form of quantity rather than price changes.

A second important institutional constraint on higher education is the tenure system, which guarantees lifetime employment to faculty except for reasons of institutional financial crisis or incompetency. In periods of market contraction this system becomes a serious barrier to adjustment because colleges and universities cannot easily offer tenure to young workers of relatively high quality. The onus of adjusting to economic changes falls on the new PhDs.

The recent unionization of colleges and universities (in 1977 over 12 per cent of campuses were organized, compared to *no* campuses in 1965 (Freeman 1979, p.28) may, due to the egalitarian goals of most unions, further constrain institutions, and, given that the general pattern among unions is to be especially responsive to the desires of older workers, may further force adjustments onto the young.

To sum up, our analysis of the distinctive characteristics of higher education suggests that the response of academia to the 1970s turnaround in the job market will be marked by: sizeable changes in the quantity of resources used, with considerable impact on the position of potential young faculty; adjustments and potentially large adjustments in the wages of faculty — the input specific to the sector.

Adjustments in Quantities

Table 4.11 examines some of the quantitative responses of the higher educational system to the 1970s turnaround. Line 1 records the number of institutions in the market: it shows a rapid growth in the number, particularly of 2-year institutions, from 1960 through 1974, followed by a notable levelling in the rate of growth. From 1960 to 1974, the number of higher educational institutions increased by 2.8 per cent per annum compared to a compound growth of 1.0 per cent from 1974 to 1978. Because of the long lead time in construction, the number of new institutions entering the market did not begin levelling off until the latter part of the decade. A number of existing institutions were, however, forced to close their doors in the decade. According to the National Center for Education Statistics, 144, largely small, private colleges went out of business (*Condition of Education 1980*, Table 4-15). A significant number of other institutions — 30 universities, 803 4-year colleges and 427 2-year institutions — reported current fund expenditures greater than current fund revenues, suggesting that more institutions are likely to go out of business in the coming decade

(*Condition of Education 1980*, Table 4-16).

Table 4.11 Number of institutions of higher education and of faculty and expenditures of colleges and universities

	1960	*1970*	*1974*	*1978*
1 Number of institutions	2 040	2 855	3 012	3 134
2-year	593	1 061	1 141	1 193
All other	1 447	1 794	1 871	1 941
2 Number of faculty (in thousands)	276	573	695	809
As % total employment	0.42	0.73	0.81	0.89
3 Expenditures (in millions in constant $)	6 523	18 500	21 470	24 071
As % GNP	.011	.022	.022	.022

Source: *Digest of Educational Statistics* 1980 (for 1978 figures): table 103 (institutions), table 130 (revenue).
Statistical Abstract of the US 1980: Table 709 (GNP) Table 793 (CPI) Table 645 (total employment). *Condition of Education* table 3.7, p.114; table 3.10, p.120; table 4.1, p.148.

Line 2 of Table 4.11 considers the impact of the 1970s developments on employment of faculty. It shows a similar market pattern of declining growth. From 1960 to 1970 the number of faculty increased by 7.6 per cent per annum; from 1970 to 1974, by 4.9 per cent; and from 1974 to 1978, by 3.9 per cent. Relative to total employment the faculty share of the employed rose by 0.31 points from 1960 to 1970, and by 0.16 points in the next eight years.

Line 3 of the table examines the overall flow of resources to higher education in terms of constant 1978-9 dollars expenditure by institutions. It shows a levelling off in spending following the booming sixties, with the proportion of total national resources devoted to higher education stabilizing at .022 in the 1970s.

From the data in the table it appears that the levelling in demand for higher education produced a parallel levelling in resources going to the sector. With the number of PhDs increasing in the early part of the period, the slackened growth in faculty employment shown in Table 4.11 had a devastating effect on the position of new doctorates and on the age structure of the faculty. Table 4.12 shows a huge increase in the proportion of new PhDs 'seeking appointments' but having no specific prospects over the period, with, it should be noted, significant differences across fields. Table 4.13 shows a notable 'aging' in the faculty.

We conclude that there were significant quantitative adjustments to the seventies labour market changes, which took the form of slackened growth in the numbers of institutions, in faculty, and in real resource usage. The quantitative adjustments fell most severely on young academics.

Table 4.12 Percentage of PhDs seeking appointments but having no specific job prospects upon receipt of degree: selected disciplines

	1968	*1974*	*1978*
All	6	26	26
Economics	3	16	19
Engineering	7	26	24
English	4	36	36
Psychology	6	26	29
Biological sciences	–	28	22
Physical sciences	–	25	23
Chemistry	5	22	21

Source: Data for 1974 from National Research Council *Summary Report of 1974 Doctorates*. Data for 'all' 1968 from H.S. Astin, Career profiles of women doctorates. In A. Rossi and A. Calderwood (Editors) *Academic Women on the Move* p.158. Other data for 1968 from D. Breneman (1975) *Graduate School Adjustment to the 'New Depression' in Higher Education* Technical Report No. 3 Table 30, p.46, with electrical engineering used for *all* engineers. Data for 1978 from National Research Council (Summary Report 1978) *Doctorate Receipts from US Universities* as sum of percentage seeking employment or seeking post-doctorate study, Table 2, p.28.

Adjustments in Prices

In addition to the quantity adjustments to change in the academic market, there were noticeable changes in prices, both on the output and input sides of the market. As we saw in Table 4.3, the constant dollar tuition and fees, and room and board, and also receipts by colleges and universities per student (net of scholarship support) *declined* after 1974 to levels in most cases below those at the beginning of the decade. Relative to the family income of the parents of likely students, the drop is even more marked. Despite all of the hullabaloo about increasing costs of higher education, and difficulties of financing higher education, the evidence shows the opposite: in a period of slackening demand, the price of the 'output' fell, as would be expected in a reasonably functioning economic market. Complaints about the cost of education are probably due to the rise in cost relative to the falling economic advantage of college training.

Table 4.13 Changes in the experience of doctorate science faculty 1968-1975

	Percentage of doctorate faculty with seven or less years since doctorate		
	1968	*1974*	*Change 1968-1974*
All	42.1	29.4	- 12.7
Physics	31.6	18.5	- 21.1
Chemistry	34.9	21.4	- 13.5
Mathematics	51.9	36.8	- 15.1
Economics	42.7	37.4	- 5.3
Psychology	43.8	38.7	- 5.6

Sources US National Science Foundation (1968: 10, table 2; 1974: 20, table B-1; 1970: 189-190, table A44; 1975: 110, tables B, B-25)

Given the inelastic demand for higher education with respect to tuition, the reduced tuition changes presumably had only a modest effect on enrolments and thus tended to exacerbate rather than ameliorate the financial problems of higher education.

Table 4.14 turns to the price of the principal input specific to higher education, faculty. It shows a sizeable drop in the real compensation of faculty in the period, which translates into an even larger decline in the income of academic relative to other workers. Econometric calculations which relate salaries to enrolments, numbers of PhDs and the like suggest that much of the salary responsiveness reflects the impact of the numbers of PhDs seeking work relative to enrolments.

We conclude that the changed demand for higher education due to the changing labour market had sizeable impact on price as well as quantity.

Other Adjustments

In addition to the classic price and quantity adjustments, colleges and universities sought to adjust to the slackened growth by marketing their product. In efforts to attract more 'paying customers' many colleges took to advertising in newspapers and magazines, to altering curriculum to appeal to adults, or to changing their curriculum. I described these efforts in *The Overeducated American* as follows:

'Cazenovia College in upstate New York, for instance, staked its future in such career-oriented areas as fashion design, and museum studies. "We'll be involved in a long-term guessing game, trying to keep one jump ahead of the competition in guessing on the careers students will be pursuing. We're no longer in the position of telling students what the requirements are if they want a Cazenovia degree. Now we say: 'You tell us what you want, and we'll provide it.' " Other campuses, ranging from Brigham Young University (Utah) to Oklahoma City University to Massachusetts State College at Boston, began experimenting with new technologies of education. With federal support, these schools sought to redefine the goals of liberal education in terms of practical "marketable" skills, often patterned after the training that companies provide for executives. Even graduate schools and professional academic associations, particularly in history and English, began to consider "what we might teach master's and PhDs that will be valuable in business employment."

'Various other recruiting techniques were resorted to. Testing organizations, such as the College Entrance Examination Board, have sold names and addresses to college administrators who used them to solicit applicants. The Riverside campus of the University of California sent out 12,000 oversized decks of playing cards carrying campus facts on the back. Some colleges pressure prospective students with the type of hard sell once associated only with profit-making proprietary schools or business colleges — mailing out slick brochures, conducting telephone canvasses, and giving out such gimmicks as free T-shirts, bumper stickers, and so on. In some cases, public relations firms have been hired to take over the whole admissions operation, receiving substantial fees for recruiting. While apparently still rare, the tactic of bounty hunting — for which propietary schools have earned much opprobium — has appeared, with recruiters paid on the basis of the number of students "delivered". The job of admissions officers, particularly at weaker institutions, is no longer to weed out unsuitable applicants but to find warm bodies.'

Since then, newspaper stories indicate that market efforts have if anything been expanded, referring to the torrent of direct-mail advertising, marketing and recruiting in college admissions. Among recent efforts are:

- preparation of elaborate filmstrips and television tapes;
- college fairs, which function like trade shows;
- ads in newspapers and on radio;
- direct mailing, with the college board selling names at 12 cents a name plus a $100 fixed fee.

Indicative of the pattern, a new quarterly magazine, *The Higher Education Marketing Journal*, was instituted to provide information on how best to expand the market.

Despite all the marketing efforts, however, from the aggregate data they appear to have had at most a slight effect on demand for higher education. In the face of the economic reality of a declining return it is difficult to see how such efforts can have more than a marginal impact, though particular schools may of course benefit greatly.

Table 4.14 Levels and indexes of faculty salaries in current and constant (1967-68) prices and the Consumer Price Index: 1967-68 to 1978-79

	Salaries in current prices		*Salaries in 1967-68 prices*		
	Average salary	*Index*	*Average salary*	*Index*	*Consumer Price Index*
1967-68	$ 11 033	100.0	$ 11 033	100.0	100.0
1968-69	11 760	106.6	11 221	101.6	104.8
1969-70	12 637	114.5	11 293	102.4	111.1
1970-71	13 284	120.4	11 373	103.1	116.8
1971-72	13 823	125.3	11 424	103.5	121.0
1972-73	14 552	131.9	11 568	104.8	125.8
1973-74	15 459	140.1	11 276	102.2	137.1
1974-75	16 403	148.7	10 770	97.6	152.3
1975-76	17 450	158.2	10 699	97.0	163.1
1976-77	17 930	162.5	10 394	94.2	172.5
1977-78	18 897	171.3	10 265	93.0	184.1
1978-79	20 120	182.4	9 990	90.5	201.4

Source: American Association of University Professors (1979) An era of continuing decline: annual report on the economic state of the profession 1978-79 *Academe: Bulletin of the AAUP* September, 1979

Summary

In this section I have shown that in response to changes in the demands for higher education induced largely by the changing job market for college-trained workers the higher educational system has undergone several fundamental changes: resources employed have levelled off, tuition and faculty salaries have fallen and efforts to expand the market have been made. These adjustments are comparable to those one might expect in other less idiosyncratic markets facing a change in product demand.

CONCLUSION

We have seen in preceding sections that the college job market underwent extensive change in the 1970s, which induced significant adjustment on the part of higher educational institutions. How likely is it that the market for college workers will remain depressed? What is the likely future for higher education? Can the way in which the higher educational system responds to changes in the market for its output be improved? This section addresses these questions.

First, with respect to the future of the job market for college graduates, my forecasts, and those of others, suggest that the market will indeed rebound, towards the end of the 1980s, in large part because of a falling supply of new graduates as the size of the youth population shrinks. While a smaller number of young persons will improve the economic situation of young graduates, it will have quite different effects on the economics of colleges and universities. As Carter (1971) warned years ago, the 1980s will be a period of substantial difficulty for colleges and universities and for academic faculty.

Because of the nature of the higher education market, there are reasons to believe that current and potential future adjustments to the changes in the market are far from optimal. First, as Breneman has noted, the 'crazy-quilt pattern of subsidies and costs' undoubtedly leads institutions, students, and governmental decision makers to make policies which, while possibly rational in terms of the prices facing them, may very well be irrational in terms of the true costs to the economy. A recent Brookings publication, *Public Policy and Private Higher Education*, has dealt with some of these issues, as they affect the position of private versus public colleges and institutions. A major cause of difficulty is governmental support of higher education through *institutional aid* rather than through aid to students. Institutional aid has the disadvantage of by-passing 'purchasers' of education. Another problem is that institutional rules place the burden of adjustment on younger PhDs and faculty. While colleges and universities are struggling to alter their employment practices to make adjustments more balanced by age, their success thus far has been modest. Third is the potential problem of excessive adjustments overshooting the socially optimal level of enrolment and degrees. In the area of teacher education, where the decline in enrolments and degrees was immense in response to the poor market for school teachers, there are already reports of potential shortages.

There are several alternative strategies or changes in modes of behaviour which institutions of higher education may find beneficial in the next decade.

Colleges and universities might ameliorate some of the problems of declining enrolments by linking liberal arts to vocational non-academic training, such as for union crafts, possibly through new degree offerings and operating procedures. By bringing together vocational non-academic and liberal arts programmes, the opportunities for blue-collar workers to undertake artistic and intellectual pursuits unrelated to their careers could be increased.

It may also be desirable to alter tuition charges to better reflect the costs of different educational programmes. For example, graduate programmes are often subsidized by undergraduate tuitions, suggesting that graduate tuitions are too low. Such changes will tend to limit graduate enrolments, an effect that is not inconsistent with the anticipated lower demand for PhDs in many areas. If such price changes are not possible, it may be desirable to limit certain graduate programmes even beyond the size determined by student choice. University policies should be such that educational prices or allocation decisions reflect true social costs, no matter who pays.

A third possibility is to reduce the amount of time required for studies, by operating full time during summer and vacation periods. The present four years needed for the Bachelor's degree could be reduced, with considerable saving to students of foregone income and at no serious loss of educational quality. All else the same, the reduction in the time needed to obtain a degree, from four to three years, would cost a student four summers of work at low pay with a gain of one year of work as a graduate at higher pay, raising the economic value of college training. While in the past the desire for summer leisure may have made a concentrated course of studies attractive to only a few, in the changed market more students are likely to find this option desirable. At the least, experiments in altering the time period of courses and the operations of academia should be made to learn the best ways to deal with the new market reality.

Because the American higher educational system is, despite its flaws, generally superior to that in the rest of the world, attention should be given to the possible expansion of foreign student enrolments, particularly from the newly rich oil countries and such developing countries as Brazil, Mexico, and others whose human resource demands are likely to outstrip the capacity of domestic universities. Already, Venezuela has initiated a major programme to 'export' thousands of students to the United States for higher education. We have a comparative advantage in producing college training which could be 'sold' overseas, taking up some of the slack in domestic student enrolment.

Yet another possibility is for institutions to cut out certain curriculum and encourage greater student cross-enrolment to schools offering different curriculum.

What is ultimately needed, however, for these or other adjustments to work best is some form of planning for the future market situation, presumably in conjunction with the governmental bodies that subsidize so much of higher education.

One hopes that, given the sizeable governmental funds involved, an effort will be made to develop economically rational plans for the next decade and an effort made to use those funds to induce economically rational decisions on the part of institutions.

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5

HIGHER EDUCATION POLICY

by Maurice Peston

INTRODUCTION

The relationship between the education system and the economy has typically been seen to be one of mutual dependence, the behaviour of each being a significant causal influence on the other. The relationship is also a rather complicated one in that it does not depend on a single connection but many. Examples of how the education system affects the economy are the provision of manpower, competition for skilled manpower, being part of the process of research and development, and influencing attitudes to work and responsiveness to incentives. Among the ways the economy affects education are the provision of resources used, the demand for the products of schools and colleges, and influencing attitudes to study.[1]

Merely mentioning these examples is sufficient to show both the complexity of the subject and the difficulty of disentangling cause from effect. While it would help the student of the subject if he regarded (say) the schools as entirely passive, responding entirely to the needs of the labour market, this is not the case, and it is highly misleading to assume that it is. Similarly, it is not true that firms merely make do with the labour that is forthcoming and have no influence on what is taught. It follows that in the presentation that follows there is a danger of misinterpretation merely because of the order in which topics are presented. It must be emphasized from the outset, therefore, that our intention to start with the labour market side of things is arbitrary and is not to be interpreted as prejudging the causal position. If there is any justification for putting that topic first, it is that the author finds it easier, which is quite different from insisting that it is more important.

The next methodological point that must be made concerns the emphasis on the labour market.[2] Although it is correct to treat this as one of our two foci, it is necessary to go beyond it to examine certain broader economic issues if the subject is to be understood at all completely. In particular, the demand for various types of labour is the outcome of the value of that labour in the economic process. This is determined in both the short and the long run by the potential contribution of that labour (ie its real productivity), and by the demand for the products, in the broadest sense, that it gives rise to. In other words, education policy must be placed in the broader context of macroeconomic policy and cannot be divorced from such matters as pay and productivity, unemployment and effective demand. Immediate, and more enduring policy measures cannot be separated from the existing economic crisis in the UK, or the chronic difficulties that appear to lie ahead of us. The chapter, therefore, will examine problems of both a short and long run nature. Moreover, while it is chiefly analytical in content, the topics chosen and the tone in which they are discussed is strongly empirical and is intended to have practical relevance.

This leads on to the next methodological question which comprises an important section of the chapter. Does education raise the productivity (or employability) of individual members of the labour force? If it does, how precisely does it do so? If it does not, what other contribution does it make? Is education merely one way in which young people mature, and the abler and potentially more economically useful ones among them are filtered out or screened? We shall indicate how the fashionable answers to these questions have changed over the years. The 'productivity' and 'rate of return' approach was in the ascendant many years ago, and then drifted away to be replaced by the 'screening hypothesis'. This view too is falling out of favour and, perhaps, a mainstream position would now contain elements of both. (It should be added en passant, and rather cynically, that economists' opinions on these matters appear to depend as much on the intellectual interest of the problems arising as on their practical relevance.)[3]

All of this takes me to the question of policy. Our opening remarks were to do with education and the economy. There is a world of difference between education and education policy. What do we mean by education policy? How, on the one hand, does it influence what happens in schools and colleges, and how, on the other, is it related to policy in general?

Education policy needs to be specified at three levels at a minimum, and probably more.[4] Central government, local government, and the schools, colleges, and universities themselves must all be taken into account, and attempts made to state what is their domain of action and their range of possible effects. This is especially difficult within Great Britain (even if the different traditions of Scotland and England and Wales are ignored). The theory of partnership in education has led to the predominent view that the influence of central government must be indirect and largely a matter of persuasion. Unfortunately, there is a great deal of mythology mixed up with the reality of the lack of direct power of central government. To the extent that ministers control the purse strings, they are bound to be in a position to influence, it not fully determine, what happens in education. An obvious example concerns student grants. Their scale and conditions of availability can have considerable effects on who attends which institutions of higher education and what is done there. Similar remarks may be made about the relative pay of teachers, the size of research funds, building programmes and the like.

What is important about policy which takes its point of departure from resources and finance is that its impact on curriculum and performance may be implicit and not fully thought out. To be contrasted with this is education policy in an 'educative' sense which in practice may be much less the business of governments and more the business of the professionals, so to speak. This is, perhaps, the greatest area of controversy with which this chapter is concerned. It involves the consideration of who actually determines what goes on in higher education, but leads inevitably to the normative question of who ought to do so. Although we pursue these topics further below, it must be said immediately that no definitive answer has yet been established for either question. (As we shall show, it is more proper to say that there are whole classes of questions to be raised, the answers to most of which are non-existent.) The positive question is obscured by the large number of forces at work. In many cases it is simply impossible to say what education policy is, or to describe the steps by which an outcome has occurred. It must be added, however, that the mythology referred to above itself has a role, namely to emphasize the academic freedom of teachers and to absolve politicians from responsibility for what happens (notably when that is rather worse than had been intended or might have been anticipated).

The blurred nature of policy is not at all unusual, and is certainly not confined to the education field, but it is probably more characteristic of that than of most other areas of government. Fundamental to the present discussion are three sets of interrelationships between parts of the governmental mechanism. Firstly, at the central governmental level there is the policy nexus that is comprised of DES (and Scottish Office) Department of the Environment, and Department of Employment. For many purposes, the Department of Industry and the Treasury must also be brought into the picture. This range of governmental interests has its counterpart in the distinction between education and training which we shall examine. It also pertains to the second set of interrelationships which we must mention, namely that between central and local government, and to the third set involving such quangos as the Manpower Services Commission and the University Grants Committe. Although, we reiterate, our whole approach will be analytical and clarificatory, it is impossible to avoid the difficulties consequent on the rapid change that is going on in all these areas. All three sets of interrelationships are in a state of flux, and the main conclusion we arrive at is that past preconceptions may soon turn out to be quite false and likely to lead to erroneous conclusions.

There are two other comments on policy which must be made in this introduction, one of a substantive nature, the other more methodological. Starting with the latter, we must examine the two key questions: (a) what *sort of thing* should education policy be?; and (b) what actually should education policy be? The two lead inexorably to the problems of criteria of performance and the accountability of decision makers in education and educational institutions.[5] The questions of how active policy should be, and whether it should have an initiating role or restrict itself to being responsive also arise here. What is noteworthy about educational policy making in this country, apart from its diffuse organizational structure, is the failure to agree about what sort of activity it is in the first place.[6] On some occasions policy seems to be restricted to statements of a very broad nature to do with objectives and the means of reaching them. This is true of policies to do with the structure of secondary education and of higher education. On other occasions policy becomes more specific and detailed, as occurred with the scaling down of teacher training in the 1970s and the disappearance of colleges of education. Yet again governmental interest may be becoming more specific still as when it concerns itself with individual school closures. Moreover, it is well known that, even when the nominal posture of the DES is strategic, ministers and officials keep themselves well informed about what happens in individual institutions, and are able to exert considerable pressure on them, albeit by indirect routes, if the occasion demands.[7] What has to be asked is whether this kind of approach, often not set out explicitly and subject to external critical appraisal, is suitable for policy making in higher education for the 1980s and 1990s. In this connection the operations and accountability of bodies such as the research councils, the UGC, and the CNAA are worthy of examination, especially in terms of their adaptability to changing circumstances.

The substantive topic we have referred to may itself be seen to arise partly within the debate on the nature of policy making. It is to do with the role of the authorities in shifting education quite definitely to meet the demands and needs of the economy. We are referring, of course, to the vexed question of manpower planning. While all of the topics we shall cover are controversial, none seems more so than the feasibility and desirability of the pursuit of an active manpower policy in education. Given the extent of the debate that has already taken place, and which will, no doubt, continue in the future, it will be impossible for an essay of this kind to come to a definitive conclusion. At most we shall be able to state what appear to be the major points of disagreement and clarify some of the issues. These, like so much else in this field, are to some extent of an ideological nature. They are concerned with that most explosive of all subjects, the efficiency and desirability of the free market. Coupled with that is concern with the legitimate role of central government, and the desirability of preserving the independence of individual institutions within a pluralistic society. While it may seem strange that such apparently simple problems as the education of engineers or the supply of sociologists lead to profound questions of political philosophy, there is no denying that they do. We shall not be able to investigate them in depth, but it must be borne in mind that they do underly much of what is argued about in this field. A failure to recognize their existence will leave much of it quite inexplicable.

To conclude this introductory section we list the main topics that are covered in what follows:

a The nature of the labour market
b Human capital theory and the demand for higher education
c Manpower planning and co-ordination

In connection with all of these, our main purpose will be to use the existing literature to set out the main points at issue and illustrate the variety of positions that have been adopted with regard to them. There is the difficulty that some of the main contributors to the field have changed their positions over time, so that on occasion what they have had to say will appear on opposing sides of the same argument, so to speak. It must also be recognized that a large part of the economics of education is the work of economists from the United States. Without detracting from its undoubted merits, it is necessary to add the warning that the institutional structure of that country is different from the UK's so that great care must be taken in importing results from the one place and applying them in the other. This is true of the nature of the labour market, the policy-making process, and even in the nature of the problems that require solution. (Perhaps it is unnecessary to add that it would also be foolhardy to go to the other extreme and ignore all overseas experience!)

THE LABOUR MARKET

The way the labour market is characterized in economics depends on the problem in hand. For some purposes the emphasis is placed on the demand for labour as a whole, and for others the relevant disaggregation is by industry. In our case the relevant considerations are:

a A disaggregation of the labour force by skill level and function
b A primary emphasis on the long run demand for labour (although reference will be made to differences in the unemployment experience of varying skill levels)
c The way remuneration varies over working lifetime
d Size of firm and the use of higher educated and skilled manpower
e The particular role of the public sector in the labour market

It must also be recognized that the labour market (or the collection of labour sub-markets) is not purely competitive.[8] By this is meant that money wages are negotiated by a process of collective bargaining involving powerful trades unions, monopolistic and oligopolistic firms in the public and private sectors, and government agencies themselves. In many cases the relevant product markets are also non-competitive. Furthermore, a great deal of the manpower we are concerned with does not produce or contribute to the production of an easily recognizable, let alone quantifiable, commodity.

An important aspect of the wage bargaining process (strongly emphasized by Keynes incidentally) is the weight placed on relativities. These may refer to the same job in different firms, or to comparisons between different jobs. Moreover, in certain cases, for example in public sector remuneration based on pay research, the central issue has been one of devising an objective method of 'fair comparisons'. How far these relativities are the outcome of powerful economic forces or are a primary causal influence themselves based largely on tradition is an unsolved problem. What can be said is that the demand even for higher educated personnel must be fitted into them.

An often forgotten side of the labour market is its dynamic nature. In the short run and even in conditions of chronic unemployment the number of people changing firms (voluntarily or involuntarily) is numbered typically in six figures. This is of the order of magnitude of 1 per cent of the labour force. More generally 20 per cent of the labour force will at the end of any year be in a firm different from the one they started with.[9] In addition, there will be very considerable job change within firms.

Some of this change will come from the demand of the firm's side and some from the supply side. It may be interpreted both as an equilibrating process in response to outside forces, and a disequilibrating initiative of its own. Individual people change jobs voluntarily in order to move from a position with lower net advantages (present and future) to one with higher net advantages. Occasionally they quit one position and remain unemployed in order to search for a new post. The unemployed, however, are not usually people who have quit voluntarily. They are out of a job because they have been fired. Their job search is an involuntary one.[10]

It is generally accepted that, although money wages are determined in the labour market, this is a sluggish process, and, therefore, individual markets do not move into equilibrium at all quickly. It follows that, in addition to the existence of general unemployment or labour scarcity, particular groups of workers may be in over supply or be very hard to recruit for quite long periods of time. Connected with this is the whole issue of substitutability of different types of labour.[11]

That is significant both for manpower planning and for the human capital approach to investment demand. Clearly, if there were a one to one relationship between education, acquired skills, and forms of employment, manpower planning would be much facilitated. A forecast of output in various sectors would be a manpower forecast as well. It would be possible to compare the likely supply of graduates of various types with the probable demand, the resulting gap being a useful signal for determining the future supply.

A more neo-classical view of labour markets complicates matters considerably, especially if the markets themselves are imperfect. Excess supply will cause some unemployment and some fall in relative wages. The latter may appear partly as a relative wage reduction in occupations which graduates of the type in question have been accustomed to entering, and partly as a move by these graduates to 'inferior' occupations. The slowness of the adjustment, of the flow of information to prospective students, and of the response of colleges provides a basis for policy intervention, notably manpower planning. At the same time, the policy maker himself finds it much more difficult to interpret the signals that the market is putting out. The case for intervention is that the policy maker has more information and is better able to process it, but that does not mean that his task is all that easy. Indeed, if it were not hard to distinguish (say) temporary changes in circumstances from permanent ones, decentralized institutions could cope, anyway. It is precisely the circumstances that make life difficult for the free market that also make it difficult for the planner.

This is equally true when it comes to the use of the human capital method of estimating the rate of return to investment in higher education. The centre of the estimation procedure is data on relative lifetime earnings profiles. Now, while there is a great deal of evidence that in the aggregate these have considerable stability through time, they are not so stable that it is safe to operate on the assumption that they are fixed for ever. In the case of graduates with particular qualifications there is evidence that lifetime earnings do vary relative to the mean depending on the long term state of the market. This would imply that a calculation based on a current profile would be in error both because that profile reflected past forces which have not yet fully worked themselves out, and because current policies will themselves have an influence on salaries of graduates.[12]

We have mentioned the fact that the market for highly qualified personnel is imperfect. An important aspect of this imperfection is that those who take decisions on employment may themselves be graduates and would be affected by changes in supply conditions. Suppose it is discovered that people with a particular qualification are earning a higher than average rate of return on the investment that has been made in them. This may, of course, simply be a result of ability. If it is not that, the neo-classical view of the matter is that more people would acquire the relevant qualifications and that institutions providing them would (or should) expand. If entry into those occupations is limited because of controls exercised by existing graduates, the competitive process will not proceed in this form. Rates of return will remain above competitive levels. Either supply institutions will not expand, but will instead raise their entry standards (or ration entry in some other ways), or the additional graduates that are produced will be disappointed in their aspirations. It should be noted that the issue is further complicated if the graduates exerting their monopoly power also control, or at least influence, the behaviour of the relevant teaching institutions.

In addition to, but not unconnected with, the exercise of market power is the fact that a large fraction of graduates enter the public sector and are contributing to the production of services not sold on competive markets. Moreover, even where they are part of the market enonomy, their contribution to the output of the enterprise is not easily measured. All this together with the fact that graduates form a small fraction of total manpower suggests that there is a fairly arbitrary element in graduate remuneration. The proposition is worth considering that what they receive is a matter of custom as well as the result of underlying economic forces. This means that graduate salaries could, for example, remain above competitive market levels for long periods of time. The institutions in question would find recruitment easy, but there might be no pressure within them to lower relative earnings. The converse may also happen. Some public sector institutions may start to pay below market levels. They will find recruitment more difficult and the quality of their intake will decline, impairing in due course the quality of the service they provide. This is a slow process, and the decline in quality is hard to discern or to attribute to one cause rather than another. Either way it is not a safe procedure to assume that the maintenance of relativities is optimal for graduate employment and supply decisions, or that empirical research based on those relativities will give a correct assessment of future needs.

HUMAN CAPITAL THEORY[14]

There are several possible interpretations of the human capital approach but central to all of them is a recognition of education as a process of investment in the individual which yields a flow of return in the future. There is less than full agreement on the nature of the investment and the returns, on who bears the cost and who receives the benefit, and, altogether, on what light all this throws on education and training decisions and the way the labour market works. Connected with that is the usual methodological issue of whether anybody consciously calculates the expected rate of return to investment in human capital as a basis for deciding what action to take, or whether the merit of the theory must be seen to rest solely on its predictive power (if that is what it has).[15] Suffice it to say that the heyday of the theory was the 1960s and 1970s, and it now seems to be in decline somewhat. Again, it must be reiterated that it is not entirely clear whether this is due to the substantive failure of the theory, or merely that it has gone out of fashion.

If education were to be regarded as an investment activity, it would not follow that the returns were necessarily in the form of a rise in productivity or economic efficiency. The investment may be more correctly interpreted as being in a durable consumer good. In other words, regarding education as primarily a consumption activity would not rule out a consequential flow of benefits over time. This itself, however, undeniably complicates matters as far as the labour market is concerned, for the obvious reason that the way that market operates is not restricted to the employment of skills in the narrow sense. Attitudes to income and work, to risk taking, to the so-called non-economic working environment may be strongly influenced by education as a consumer good, including its durable aspects. Although these are matters which economists have not pursued as far as they might, the way people respond to economic stimuli (so-called incentives and disincentives) may well be strongly influenced by their own education and that of their teachers and parents. (It should be added, parenthetically, that the economic effects of teachers' education is specially important for the labour market in general, but like so many of these non-quantitative aspects of the subject has tended to be neglected.

There are some elementary points to be added here. One is that the durable consumer good approach is compatible with education, as it is experienced, being either an enjoyable or miserable time, so to speak. The subsequent benefits may merely enhance the pleasure of the immediate experience, the two together more than meeting the cost, or the subsequent benefits may overcome both the pain of the immediate experience and other costs. Secondly, the benefits in this (as in subsequent cases) will not be received solely by the person being educated. Some consumption benefits accrue to parents, and much of what are called the external benefits of education are correctly to be interpreted as social consumption rather than productive investment. Thirdly, there is the philosophical point that if education changes tastes, like is not being compared with like when the benefits and costs are being assessed over time. Nonetheless, it is hard to argue that as a result it is impossible to take a rational consumption decision with respect to education. Fourthly, and probably most seriously of all, education as a durable consumer good complicates enormously the assessment of education as a capital good.

While the protagonists of human capital theory recognize the consumption aspect of the education process, and the complications it gives rise to, they argue that the productive investment interpretation is a correct and fruitful one. Education, and in the present case higher education, adds to the economic potential of the individual concerned which is reflected in a capacity for doing more jobs which whould otherwise be beyond him or in an improved ability to do various jobs which might have been considered appropriate for him in the first place. (Logically, the first possibility is a limited case of the second.) While it is recognized that maturity, intrinsic ability, and experience gained on the job all make a contribution, the human capital theorist asserts that increments in education have an effect in addition to them.

The existence of a positive return to investment in human capital has predictable consequences. Typical of these are:

a The demand for extra education should vary inversely with the interest rate used to discount its future returns. This would be reflected in a time series analysis: ie if the interest rate fell the aggregate demand for places would rise. It would also be reflected in a cross section study: ie those prospective applicants with access to cheaper finance could demand more education than those who found it difficult to obtain funds.

b The demand for extra education should vary inversely with incomes earned by the less educated, and directly with incomes earned by the more educated. It should also vary inversely with fees charged and with other necessary associated costs.

c The demand for extra education should vary inversely with expected working life beyond the period of education.

d The demand for extra education should vary inversely with the variance of the return (assuming the typical person is risk averse), the riskiness having to be offset by a higher mean return for the same level of demand.

There are several methodological difficulties connected with these and related propositions. Firstly, they involve variables that are unobserved and even unobservable. The interest rate used to discount the future is not something objective such as minimum lending rate, but the actual cost to the student of borrowing funds. Something is known about this: for example, that it is not the same for all families because of the imperfections and uncertainties of the capital market. Very poor people have no access to funds (ie the discount rate is infinite). Rich people with collateral can borrow at the market rate. People with funds may not be able to invest them financially on favourable terms; therefore, it is inexpensive to use them for such personal investment as the education of their children. The lack of more precise details make it extremely hard to test the theory with a good deal of confidence about the outcome. Secondly, many of the predictions of the theory follow from rather simpler theory, and, indeed, are pretty much a matter of common-sense. There is no obvious need to postulate an interest rate mechanism when explaining the correlation between parental income or social class and the demand for higher education. Similarly, it would be extraordinary if expected future income relative to current income were not an important determinant of demand. (It should be noted en passant that 'expectation' again adds a typically unobservable element to the theory, making it open ended and difficult to test). If the distinctive character of the human capital approach lies in the attention that it pays to the cost of higher education, especially in the sense of foregone opportunities, it must also be remarked that the empirical evidence is not overwhelmingly in its favour. The evidence on the significance of costs as an explanatory variable is not at all clear cut. Furthermore, although such methods are notorious for their methodological dangers, direct attempts to determine students' sensitivity to cost factors also fail to provide very strong support for human capital theory. Nonetheless, it is important to avoid going to the other extreme. It would, after all, be absurd if the new theory contradicted the most obvious conclusions that have been established. It certainly provides an insight into the relevant relationships, and a great many successful empirical studies of various aspects of higher education have been guided and illuminated by human capital concepts.[16]

Screening Theory

One alternative to human capital theory that has been proposed is the 'screening' hypothesis.[17] This may best be understood from the side of the employer. He has in mind certain desirable characteristics of the labour force he proposes to take on. It is extremely difficult to determine these directly. If, however, they are correlated with education, it makes sense for him to offer higher salaries to people the higher the level of their educational qualifications. The contribution of education is a screen; its productivity deriving from the information it provides for the employer. Note that this does not imply that education institutions are unproductive, but it does change the interpretation of the nature of their productivity.[18]

If we ask, for example, why more educated people make a more valuable contribution to the firm, the answer is usually to do with flexibility, capacity for coping with difficult and changing circumstances, motivation and leadership qualities, and ability to acquire and learn from new experience, both formally and informally. Some of this is directly related to the exercise of intelligence and intellectual skills which are advanced by universities and colleges; some is more a matter of character which is again supposedly enhanced by a period of higher education. The screening hypothesis focuses on the same attributes, but insists that they are present in the individual anyway. All that higher education does is to establish their presence in particular individuals. All these relevant qualities are revealed, but not produced by a successfully completed three-year course of study to Honours degree level. One variant of the theory states that maturity is important. The relevant qualities are only potentially available in 18-year-olds. They become usable in 21-year-olds. The role of higher education is one of storage. Universities and colleges are the cellars for each annual vintage of high quality personnel.

The weaknesses of the screening view are obvious. It relies on higher education being the cheapest form of screening and maturing which on the face of it is not very likely. In particular, it fails to explain for the UK why the three-year Honours degree should be the correct screen for almost all subjects and institutions.[19] It fails to explain satisfactorily why earnings correlate with work experience, since the firm can itself learn about the quality of its employees by their performance on the job.

Both the human capital approach and the screening hypothesis have been proposed as positive theories able to explain what actually happens. They supposedly explain why employers are willing to pay more for people with high education qualifications, and why employees endeavour to gain admittance to higher education institutions to obtain degrees. Neither is entirely satisfactory in accounting for the facts, and both fall down in explaining the nature of the education system in the UK. If higher education is productive, either directly or as a filter, this appears to be more a by-product of what happens there rather than a main result of explicit objectives and plans. At the very least theorists need to pay more attention to the nature and length of the curriculum, its continuous nature, and the academic standards aimed at.

Questions of this kind also lead on to the normative side of the subject. Even if we continue to be happy with the ability of theory to explain what happens, it can be a useful guide to policy. The human capital approach has given rise to attempts to estimate the social rate of return to investment in higher education. On the assumption that the costs of higher education are borne partly by the individual involved and partly by the taxpayer, and the benefits received partly by the same individual and partly by others in the form of external economies, does the present discounted value of the latter exceed the former? If such a calculation can be done, and the results shown to be with respect to reasonable variations in the underlying assumptions, can policy be used to change the scale of higher education appropriately? Do capital market imperfections, excessive sensitivity to uncertainty of return, and external economies cause the private demand for higher education to be too low? Should the system then be expanded and students be subsidized rather than simply be loaned the money needed for a period of study? Can more detailed estimates of this kind be undertaken which would elucidate the social rate of return on investment in particular subjects, or particular departments, or even whole institutions? In particular, can they be reliable enough to guide higher education policy? Similarly, can the efficiency of individual subjects, departments, and institutions as screening agencies be assessed? Is it possible to derive alternative methods of screening which are just as effective but cheaper, or more effective and no more expensive!

As far as the operating costs of institutions are concerned, no basic difficulties arise which cannot be overcome. There are complications to do with overheads, the use of capital, and other dynamic elements in costs, but these are no more significant in universities than in ordinary enterprises. They may well give rise to arbitrary procedures in practice, but in as far as we live with their consequences in the pricing and output decisions of firms, there is no reason to reject them in education. To put the matter bluntly, the costs of higher education can be estimated in a suitably disaggregated form on a regular basis. To the extent that they differ systematically between subjects or institutions they give rise to a demand for an explanation, which in turn may indicate a possible policy initiative. The decision not to collect the figures may be because it is too expensive to do so. It then needs to be explained why such considerations should weigh so heavily in higher education. A second reason not to collect them is that the questions they give rise to are unanswerable: ie one cannot say why a physics degree should cost more than one in English, or why a physics degree in one department should be more expensive than in another. Again it is hard to see why this should be so a priori, especially as the purpose of the exercise is to monitor costs over time. More generally, the case for the emphasis to be placed on costs is that it increases the pressure to identify and elucidate benefits.[20]

But having said that, experience has shown that it is immensely hard to quantify the benefit side of the equation with a view to identifying, so to speak, the contribution of investment in higher education. The reason is partly that the social benefits are so diffuse; which is not at all the same as saying that they do not exist. There is also the point that the policy instruments may not be available to make use of the results that are forthcoming.

More important, perhaps, than either of these is disagreement over what constitutes a benefit. There is the point raised at the outset that many academics believe that too great a concern with the outside world and especially the economy is damaging to true academic values of scholarship, free inquiry, and rigorous thought.[21] The converse proposition is also put forward that the benefits of higher education in the form of managerial and practical scientific skills occur faute de mieux. They arise notwithstanding all the academic pressures to lower them in esteem. Either way, while the human capital approach is correct in emphasizing the consequences of higher education as a flow through time, since many of them are qualitative in nature, it is difficult to place them within the calculus of discounted cash flow.

Another topic which requires further examination is the importance of the specific curriculum. It is, presumably, obvious that a person wishing to be a research chemist should study that subject at first degree level, or at least should study some scientific discipline. It is not self-evident that a person wishing to pursue a managerial career in the chemical industry should be a chemist. Nonetheless, prima facie it might be thought to be a useful qualification for that purpose. It may also be true that an Honours degree chemist will do an extremely useful job in general management. What has to be asked is whether the extra cost of producing a chemist, compared with a graduate in the arts, humanities, or mathematics, yields compensating benefits. Now, it seems reasonable to say that there are strong complementarities in management so that the staff as a whole gain from a mixture of academic backgrounds. The chemist may be no better in management than the student of English, but the two together may do a better job precisely because of their different educational experiences.

Unfortunately, here as elsewhere we are led to extremely interesting questions which cannot be answered with a great deal of confidence, and with the sort of detailed precision which policy makers would like. To discover that some science graduates go into forms of employment distant from their original training does not mean necessarily that resources have been misallocated in higher education.[22] The problem is to do with how many scientists and what they are actually doing by way of careers.

The complementarity problem goes beyond the relationship between individual disciplines to include the range of relationships between higher education staff and all other personnel. It is often argued in favour of graduates that they raise productivity elsewhere in the economy. This is obvious in the case of those who make relevant discoveries and inventions in science and engineering. Similarly, people skilled in language facilitate the successful work of those who are not. More generally, an expansion of higher education may raise the productivity and real income of all non-graduates. The point is that this will not be true for an unlimited expansion but general principle is not sufficient to say what the appropriate scale of higher education should be.

Just as new capital equipment may make old capital obsolete, and a decision has to be taken about when to end the working life of past investment, so the human capital approach suggests a similar range of opinions with respect to the products of higher education. If more graduates are produced, relatively speaking their price will fall. They will not only crowd out some non-graduates, but will also make it less worthwhile to hold on to graduates of past times. Conversely, a scarcity of new graduates will cause the length of economic life of their predecessors to be prolonged. It may also make it worthwhile to incur expenditure on their retraining.

To revert to the logic of externality, the new graduate will make a contribution precisely because of his newness. His inexperience may not be altogether a bad thing, and to absorb him too smoothly into existing modes of operations may not be wholly advantageous. The benefits of fresh minds suggesting a new approach will accrue across the whole of an organization or set of organizations. They will represent a flow of external economies which the human capital approach should treat as a benefit in determining the optimal higher education investment programme. Once again, however, they are difficult if not impossible to quantify.

To summarize, the human capital approach viewed as positive economics offers a coherent theory which throws light on a number of aspects of the demand for higher education. In practice in a country such as the UK it throws some but rather less light on the supply side. An alternative theory such as the screening approach also offers useful insight, and the two theories can be made to complement each other. Unfortunately when it comes to empirical testing (again especially on UK data), the position is a great deal less clear. While it is too much to say that the theories have been refuted, they are not so well substantiated as to suggest that a more common-sensical, less formal theoretical, approach has been decisively refuted. To a considerable extent all we are discussing here is the broad use of mainstream economics in the analysis of educational decisions, whether this is to do with costs and benefits as flows over time or decisions in conditions of uncertainty. It may be expected that economics will be no less useful here than elsewhere, but it can hardly be expected that difficulties not surmounted in the study of private industry will disappear in the more complicated area of public sector institutions. A similar conclusion applies on the normative side. It would be wrong to say that cost-benefit analysis in a human capital formulation is quite useless. The least it does is to uncover and make precise a whole range of interesting problems. Where it falls down is in translating its fascinating ideas into real practical counterparts on which action can be taken. Even here, in judging it, however, it is fallacious merely to emphasize its drawbacks. Alternative ways of dealing with these problems also have their drawbacks. If a failure to formulate a theory tends to conceal them, it does not follow that they do not exist or have been overcome.

MANPOWER PLANNING

Manpower planning is an extremely controversial subject, and within the context of higher education it arouses the strongest emotions. Not surprisingly, part of the trouble stems from misunderstanding between the two sides; ie of what the advocates of manpower planning propose and what its opponents assume determine the demand for and supply of higher educated manpower. The purpose of this section, therefore, is entirely one of clarifying the subject (It must nonetheless be added, to avoid charges of concealed bias, that the present writer is a supporter of manpower planning in a positive interventionist sense.)[24]

Virtually all graduates end up in paid employment largely of a white collar nature. Moreover, even though they have shared in the unemployment of the present depression, this is not a typical experience and the overwhelming majority of graduates find themselves permanently in jobs if they so wish. In addition, without begging the question of whether there is a positive net return (social or private) to investment in higher education, graduates certainly earn higher salaries than the national average and work in superior conditions. It has also been established that, as far as conscious motivation is concerned, employability and higher income and a better working environment are important reasons why a degree qualification is sought. Within that it is also true that the actual degree desired and selected is influenced by the particular job, or class of job, that the candidate has in mind. (To the extent that the student is undecided, this is frequently reflected in his choosing a course offering a wide range of employment options.)[25]

Viewed from the side of the university or polytechnic, again it is easy to establish that the labour market is not totally neglected. In some subjects of a professional nature the point is obvious, namely that standards and the content of the curriculum are geared to what is agreed to be the requirements of an engineer, doctor, accountant, etc. In an apparently more academic discipline such as chemistry, where a large fraction of graduates go on to work as research chemists in private industry and the public sector, there is explicit concern with preparation for employment. Turning to the social sciences, some degree courses (for example, in psychology and operations research) are explicitly vocational, as are some diploma courses in social work and the like. Moreover, although in a general sense the undergraduate curriculum is not overwhelmingly vocational, it does tend to contain elements which it is hoped will be useful in subsequent employment. The obvious example is the attempt, albeit not always successful, to include a numerical content in such courses. It should be added that at the higher degree level where the successful student hopes to go on to become 'an economist', 'a sociologist', etc., the professional nature of the qualification is very much a dominant consideration. Lastly, it must be remarked that across the whole of higher education, and not excluding the arts and humanities or the purest of pure sciences, academics are not indifferent to what eventually happens to their students in the outside world, so to speak. Even a casual perusal of the literature put out by such departments indicates that they do recognize the employment consequences of what they offer, and wish to claim that their teaching efforts have positive results, or at least non-negative ones, in this respect.

Now, if the students who demand places and obtain appropriate entry qualifications take economic considerations into account, and staff do too, the system of higher education will clearly be a responsive one, in the sense that it will reflect manpower considerations. Colleges and departments anxious to establish themselves will endeavour to meet student demands, not least of which will be subsequent employability. (It is worth adding that the 'better students' are no less interested in good jobs than the inferior ones.) It will be equally true that those places anxious to expand will seek out student demand and try and meet it, especially if they wish at the same time to maintain entrance standards.[26]

Students too will not be choosing in total ignorance. From school onwards they are bombarded with literature and advice on the relationship between qualifications and employment. They are told what sort of graduates are scarce and which tend to be in oversupply. Information is supplied on salaries, and, regretfully, nowadays, on the likelihood of unemployment. Although much of this is hearsay, they will also gain the impression that such and such a department in university X is most successful in helping its students to get good jobs, while another department in another place is less so.[27]

All these points are made to emphasize the proposition that manpower planning is not to be approached as a method of filling an otherwise empty gap. The existing response to the needs of the labour market is neither totally random nor arbitrary. The key questions are whether it is imperfect, and whether it can be improved upon. (This latter question should be interpreted to mean whether manpower planning will yield benefits that exceed its cost.)

Before setting down the considerations which might lead to some tentative answers, it might be worth recalling the manpower policy that already exists or has existed in the UK.[28] This must start from the recognition that not only is the financial bill for higher education met largely by the tax-payer, but also that a sizeable fraction of all graduates end up working in the public sector in one form or other.[29] Thus, the DES has always taken a close interest in the teacher training colleges so that their scale of operation does not get too far out of line with the likely demand for teachers. Similarly, the output of the medical schools, although not finely regulated, has to be assessed relative to the needs of the NHS, and the leakage of doctors abroad and into private practice. In the past, attempts have been made to estimate the demand for scientists and engineers over time, although the methods used were rather primitive and the results not terribly accurate. In addition, professional bodies (eg the engineering institutions) have endeavoured to take a view of the number of graduates of various kinds that are likely to find employment, and have also concerned themselves with whether the higher education they receive is appropriate for their ultimate employment.[30] In the arts field there are occasional bursts of activity connected with a desire to promote an academic interest in the language and customs of a particular country with a view to competing more effectively in its markets. (Presumably, the rise and fall of Russian studies had more of a political objective.)

To list these and similar examples is mostly to stress the ad hoc nature of the intervention that takes place. Clearly, there is no systematic attempt in the UK to monitor the labour markets for higher educated manpower, and to influence on that basis the scale and structure of higher education. Although the UGC is not completely uninterested in the employment experience of graduates, and no doubt bears this in mind when allocating funds, it is not a manpower planning body. In the public sector there is, of course, no equivalent national body, and no overall rational plan for the polytechnics, let alone a manpower policy.

Surprisingly enough, despite all this, ministers and other leading public figures frequently express opinions which imply that they believe a manpower policy is both feasible and desirable.[31] It is not regarded as prima facie nonsense to suggest that the country needs more of some types of graduate and fewer of others. Comments are often made that the curriculum in one field or other is irrelevant to industry's requirements. Perhaps more significant still, the assertion is often made that there is too low a correlation between the quality of students and the national economic significance of the subjects they choose to study. In its crudest form this amounts to the statement that too few bright students go into engineering and industrial chemistry and too many into English and history. At the same time, other commentators take precisely the opposite view of intervention. Thus, there are economists who believe that such planning is not feasible, and attempts to introduce it will do more harm than good. Others regard it as irrelevant because they believe that the existing system works well enough. Some commentators, chiefly non-economists, object on the grounds that explicit concern with the needs of industry is not the business of universities, the quality of which will be seriously eroded if the output of particular sorts of graduates is planned and controlled.[32]

Bearing these comments in mind, the easiest point of departure is that of student choice. There are two aspects of this that must be mentioned. One concerns the effectiveness of choice relative to the student's own desires and interests. The second is whether this adequately reflects national (or social) needs.

We have noted already the evidence which suggests that, while eventual career is not the only factor that influences a student in deciding whether to proceed to higher education and what course to follow, it is a very important one. Such a choice is in the best of circumstances a difficult one and is fraught with uncertainty. It follows that there will not be a one to one relationship between student choice of subject and eventual employment. For many, if not most students their higher education will not amount to training for a specific job. Secondly, where a potential relationship can be defined (eg 'a chemist', 'a mathematician', 'a lawyer') there will not necessarily emerge a short period of equilibrium in the sense of plans and expectations being fulfilled. To the extent that both the labour market and the system of higher education are slow to adjust, so-called surpluses and shortages will persist for long periods of time. Thirdly, the curriculum will be broadened to allow the student to cope with whatever eventualities occur. This will also cause a great deal of specific training to take place outside the higher education system when the need for it is actually recognized. (In other words, prospective employers will be correct in asserting that the graduates who come to them 'know nothing'. That is the inevitable consequence of the existing system.)

What we are arguing is that the present state of affairs may correspond to an attempt on the part of students to make rational choices in difficult circumstances, and an attempt on the part of higher education institutions to respond to them.[33] To the extent, however, that the choices and the response could be improved there is a role for manpower planning at least in the minimal sense of the provision of information. This would amount to:

i Information on the employment position of the stock of graduates by subject, degree class, etc. Included in this would be what is known about salaries and conditions. The regular provision of such information would also facilitate the estimation of rates of change of the relevant variables.

ii Information on the age structure of graduates of various types, and, therefore, of the flows of new graduates required to maintain the status quo, so to speak.

iii Information on the flow of new graduates of various kinds from the universities and polytechnics. Here too what is relevant is the rate of change of the flow as well as its current level.

It should be added that insofar as such information is already collected, it also needs to be widely disseminated in a form which is reasonably comprehensible. Moreover, given our emphasis on rates of change of the stock and flow of graduates and their employment conditions, it is not a matter of the once-for-all acquisition of some facts, but of a continuous process of regular data collection.[34]

Before going on to discuss whether manpower planning need amount to anything more than the provision of useful information, an additional comment must be made about the state of the economy at the present time. Earlier discussion of higher education and the use of qualified manpower, as we have already remarked, has been based on the assumption of permanent full employment. Thus, for almost all purposes it was reasonable to concentrate on the trend, since fluctuations about that would be random or short lived. The position since the mid 1970s has become rather different. There has been a chronic downturn in the economy together with a change in trend, and it is hard, if not impossible, to distinguish the two. The economy has declined further than expected from full employment and is finding it more difficult to return to such a position. (This is true even on the most pessimistic definition of what the full employment position of the economy is likely to be.) It follows that it is no longer possible to plan or assess the position solely according to the trend. On the one hand, it is that much harder to determine what the trend is, and, on the other, the period of time away from the trend has become of significant duration. A typical graduate's working life is forty years. To be away from appropriate employment for a couple of years, while unfortunate, is not serious; to be away for ten years is large enough to verge on the catastrophic.[35]

Reverting to the question of the sufficiency of the information approach to manpower planning, the key question concerns the efficiency and optimality of decision making. Can and do individuals and institutions take the decisions which are appropriate to them? and Is the outcome of those decisions satisfactory (let alone optimal) from a national standpoint? It should be emphasized en passant how important it is to distinguish these two questions, which correspond to, but are not the same as, the distinction between private and social returns to education. The first question is about the extent to which individual preferences are translated into action, and whether outcomes tend to correspond to individual expectations. The second concerns the effects of this on the rest of the community, and involves the broad issue of externality. On the latter, since students do not typically come from poorer homes, and do not end up with below average incomes, the income distribution case for public subsidy of higher education is imperfect if it exists at all. It follows that prima facie the externality case must be hypothesized. If such externalities are shown not to exist, the presumption in favour of public finance of universities and polytechnics is considerably weakened.

As far as the individual student is concerned, even with as good a flow of information as possible, the problem remains of his lack of experience, and, therefore, of his inability to choose correctly for his own future. Inexperience will, of course, be offset by parental and teacher advice, but the question arises as to whether this is sufficient, or whether there are not grounds for intervention by an external body. The reason is that parents and teachers are not able to take an objective enough view of the future, especially when it is changing rapidly. They themselves are locked in their own experience, so to speak, and may not be able fully to appreciate how circumstances are changing. This is reflected in the tendency of schoolchildren to select for university level study what subjects they are acquainted with at school. It is suggested, therefore, that the system is biased in a particular direction: eg towards geography and away from engineering. The point holds a fortiorii if it is true that school teachers themselves are biased. Within the typical school curriculum a fifth former will not have been taught as a rule by a statistician or by anyone with direct experience of technology. His language teachers will have been educated within an arts faculty and will have little or no experience of the use of foreign language in industry and technology. The list is endless and suggests that in addition to manpower planning as a form of information flow there is also room for an advisory service for parents, teachers, and the pupils themselves.

On instiutional response, it is apparent that what is offered is not based solely or even largely on meeting demand.[36] Colleges have other aims and possess the monopoly power to meet them to some extent. Moreover, within the existing system in the UK this monopoly power is not easily eroded. There are powerful restraints on new entry into oversubscribed fields operating through the DES, the UGC, the CNAA, various professional bodies, and the system of staff remuneration. Even if these were to be eased, there remains a considerable overhang of history enabling academic reputations to be preserved when they have little or no foundation in current reality. A particular university may give its students what by any objective standards would be recognized as a good education, and useful professional training, and then place them in a satisfactory first job, but still receive no public recognition.

The system of higher education as a whole, therefore, only partially adjusts to student demand, some institutions carrying much more of the brunt than others. The competitive process is extremely imperfect, and innovation is risky and unlikely to yield an appropriate reward. It follows that, even if it were correct to argue that meeting student demand was the proper role for the higher education system, in practice this is unlikely to be done optimally by universities and colleges left to themselves.

There is one aspect of demand which complicates the issue to a most serious extent. It is true of education in general, but most certainly of higher education, that the recipients do not regard themselves as good judges of all they receive. The student places himself in the hands of the teacher in the hope that what he is taught is appropriate in itself and as a preparation for future life. Even where the teaching appears not to be all that good, the tendency is to give the teacher the benefit of the doubt in that his status far outweighs the commonsense judgement of the young and inexperienced. The student wants to believe that what he is offered is excellent, and only very reluctantly will be change his mind. This means that the time lags in any self-adjusting system will be exceedingly long. The process of adjustment may indeed be so slow that it actually does more harm than good. Left to itself the system may be solving the problems of a generation ago and ignoring those of today let alone of the future.

That higher education institutions possess monopoly power, are creators of demand, and are slow to respond to independent changes in demand gives rise to some need for intervention.[37] If, further, all these imperfections reflect themselves in a bias away from the needs of the economy and the labour market, the intervention will have to be in the form of some sort of manpower policy. This is not, of course, to say that such a policy is easy or cheap, and it may also be rejected on other grounds such as the preservation of academic freedom and independence. There is also the difficulty that status plays such an important role in academic life, and that the hierarchy of institutions is determined so much by tradition and past performance. To the extent that this was typically 'other worldly' or only valued a narrow range of employments, new institutions will be more likely to copy those aspects of the old rather than reject them and risk being branded as inferior on that account.

It may be concluded that all of these considerations together with our remarks on the behaviour of the labour market create a prima facie case for intervention based on manpower criteria. Much of this intervention will be concerned with the improvement of information flow, and assisting higher education to respond to the various kinds of demands made on them. In addition, it is reasonable to suggest that because of the many imperfections in the system, a wide range of opportunities should be created to rectify past errors.

The key issue beyond all that is whether the government should devise a system of manpower forecasting together with a method of controlling universities and polytechnics with a view to meeting predicted future demand for qualified people. The case for such a move derives from all that we have said about the limitations of the current state of affairs, especially bearing in mind the costs of producing an Honours graduate. The case against it stresses the difficulty of the task, and the ease with which a central agency may add to the problem rather than offset existing mistakes.

Concerning the case for, it stems partly from the planning authority being better able to forecast demand than individual students and teachers. (It does not, incidentally, depend on the authority being able to forecast demand without error.) It also stems from the view that individual preferences lead to choices not in the national interest. In crude terms, it is based on the view, possibly supported by a human capital approach to cost benefit analysis, that the net social benefits of an engineering qualification exceed one in sociology. If this is the case, unless there are to be unemployed engineers or overpaid sociologists, the planners must also take steps to influence the labour market. There is the view that industry is not a good judge of the graduates it needs, and that the role of manpower planning is to influence the curriculum and then to encourage employers to make appropriate use of the skills which the new generations of graduates would acquire. The contrary position is that it is the academic community which fails, and that intervention is required to translate industry's needs into the curriculum. Either way a case emerges for intervention, for some degree of forecasting, and for some change in financing procedures.

The argument against manpower planning starts from the bad experience of the past where in certain cases (doctors, scientists and engineers) it has not been all that successful. It emphasizes both future uncertainties and the capacity of the system to cope with them. Recalling our earlier comments on the labour market, there is considerable room for substitution of skills, and the acquisition of new ones. Universities and polytechnics do vary the flow of graduates of different types, and although this is small relative to the existing stock, it will be sufficient to meet most normal changes in demand. Apart from that it is doubtful whether planners can improve on the decentralized system in the acquisition and interpretation of information. They are much more likely to blur the clear signals of what the economy is demanding.

It is a matter of judgement whether either of these points of view is convincing. There seems to be a wide range of opinion which is critical of the present state of affairs. Where doubts emerge is in our capacity to improve upon it. On this one final comment can be made. A view of manpower planning that was popular in the late 1960s and early 1970s was based on the construction of an overall economic plan for the whole of the economy from which demands for skill levels and types of qualified manpower were inferred. The next step was then to cause the universities and colleges to meet the demands. Although it was interesting to examine such an approach, lack of data, and an inability to estimate all the relevant mathematical relationships, prevent it from being an appropriate way to intervene in the system. This is not to say that attempting to gain an overall view of the economy's manpower position is a waste of time. Quite the contrary, it is economically valuable. The mistake is then to assume that it is possible to go beyond that and actually manipulate the system regularly on a large scale.

There is, however, an alternative, which is to approach the problem in a preconceived fashion. What is needed is a monitoring authority able to discover imperfections in the existing situation, and possessing at least minimal powers to bring these to public notice. In addition, either this or a related body such as the UGC with access to finance can try to modify the output of graduates so as to correspond more closely to what is required.

NOTES

1 For a good treatment of these matters see Blaug M. (1970) *An Introduction to the Economics of Education* London: Allen Lane/The Penguin Press, and Cohn E. (1979) *The Economics of Education* Cambridge, Mass.: Ballinger. Both of these books are very much in the neo-classical tradition which means that they tend to regard a number of the issues to be discussed here as non-economic.

2 An excellent account of labour economics in general is to be found in Hunter, L. and Mulvey, C. (1981) *Economics of Wages and Labour* London: Macmillan. Special reference should be made to chapters 9 and 17.

3 It is of considerable interest to note that in the early 1960s many economists and others felt that there was a strong presumption in favour of the view that education was conducive to economic advance. Since then many more, perhaps a majority have come to doubt this view. One explanation has been the association of increasing education of the labour force with an apparent decline of the underlying rate of growth of OECD countries. Since, however, it is likely that there are other more plausible explanations of the recent poor economic performance of these countries, this correlation may be regarded as largely spurious.

'All countries have increased the educational qualifications of their populations significantly since 1950, but the economic significance of this is probably no greater than the changes which occurred from 1870 to 1950. In 1976 the average stock of formal education per person in these countries was 9.7 years. In 1950 it was 8.2 years. The evidence available for a few countries suggests that in 1870 the average stock of education per person in these countries was about 3 to 4 years, with substantial sections of the population illiterate and with very little higher education at all.

'It does not seem, therefore, that the postwar acceleration of productivity growth was matched by an acceleration in the growth of educational capital. Similarly, it is clear that the slackening in productivity growth in the 1970s is in no way due to a slowing down in the pace of growth of educational capital.' Madison, A. (1979) Long run dynamics of productivity growth, *Ranco Nazionale del Lavoro. Quarterly Review.* March, p.23.

4 See Becher, A. and Kogan, M. (1980) *Process and Structure in Higher Education* London: Heinemann. This is a valiant effort to explain many aspects of the policy-making process, although its treatment of many issues, and notably the economic ones is necessarily incomplete. See also Carter, C (1980) *Higher Education for the Future* Oxford: Blackwell. An early attempt to provide an economic theory of the behaviour of higher education institutions is Peston, M. (1969) Towards an economic theory of higher education, *Higher Education Review.*

5 Becker, T. and Maclure, S. (Editors) (1978) *Accountability in Education* NFER. Peston, M. (1980) Economic aspects of accountability, *Education Policy Bulletin* Autumn.

6 This is noteworthy in the evidence given to and in the Fifth Report from the Education, Science and Arts Committee, 1979-80, *The Funding and Organization of Courses in Higher Education* London: HMSO, HC787-I-III.

7 In this connection it may be remarked that it is hard to tell from published statements what the DES actually does as opposed to what it ought to do. See Fifth Report, para. 45.

8 This paper was written independently of that by Laurence Hunter (see Chapter 2). It is noteworthy that, while his whole treatment is compatible with ours, his section 'Market mechanisms and shortages' is particularly in the spirit of the present section. Given its scope, there are inevitably many other points where the present discussion relates to matters raised earlier in the monograph but it would be impracticable to mention them on every occasion.

9 There are enormous difficulties involved in the estimation of labour turnover; attempts to throw light on this in detail are limited by the imperfect nature of the available data.

10 A useful overview of the literature on job search is Lippman, S. and McCall, J. (1976) The economics of job search: a survey, *Economic Inquiry.* See also Reid, G. (1972) Job search and the effectiveness of job finding methods, *Industrial & Labour Relations Review.* Since this is relevant to our comments below on manpower policy it is worth noting that Reid concludes

that informal methods of job search are no worse than formal ones both in the time they take and the sort of job found.

11 The sluggishness and imperfections of the labour market may be revealed in a variety of ways. There is a lack of response of *relative* wages to market conditions, the persistence of structural unemployment, and the necessary substitution ex post of qualifications and skills. It must be admitted, however, that all of these can be explained in other ways, and it is just possible to hold on to the view that the market, while not fully efficient, is doing the best it can in the circumstances.

12 The rate of return to investment in higher education is a function of the static lifetime addition to earnings multiplied by the economy's growth rate. The return may decline both because the differential is narrower and because the growth rate is lower.

13 It is, of course, possible that some existing graduates, notably teachers, gain by expanding student numbers, although the students themselves and other earlier graduates may find their relative remuneration falling.

14 See Blaug, M. op. cit., chapters 1-2 and Ziderman, A. (1978) *Manpower Training: Theory & Policy* London: Macmillan.

15 Freeman, R.B. (1971) *The Market for College Trained Manpower* Cambridge, Mass.: Harvard University Press. In this work considerable evidence is evinced to support a human capital approach to the demand for science and engineering education. These results are not immune to criticism, but they do represent at least a useful start to serious research in this field. It is worth mentioning in addition that it is not entirely satisfactory from a methodological standpoint to subject human capital theory to more stringent tests than micro-economics in general. O'Connell, J. (1972) The labour market for engineers: an alternative methodology, *Journal of Human Resources* Winter.

16 Having been one of the original supporters of the human capital approach Blaug has tended to become more critical of it. Nonetheless, he has concluded recently: 'The human-capital research programme has moved steadily away from some of its early naïve formulations, and it has boldly attacked certain traditionally neglected topics in economics, such as the distribution of personal incomes. Moreover, it has never entirely lost sight of its original goal of demonstrating that a wide range of apparently disconnected phenomena in the world are the outcome of a definite pattern of individual decisions, having in common the features of foregoing present gains for the prospect of future ones. In so doing it discovered novel facts, such as the correlation between education and age-specific earnings which have opened up entirely new areas of research in economics. Whether this momentum can be maintained in the future is, of course, anybody's guess.' (Blaug, M. (1976) The empirical status of human capital theory: a slightly jaundiced survey, *Journal of Economic Literature* pp.849-50)

17 See Blaug, M. ibid. pp.845-849. It is not clear who is the originator of this approach, but reference must certainly be made to Arrow, K. (1973)

Higher education as a filter, *Journal of Public Economics* July.

18 Of course, some higher educated people are demanded because of the specific skills they possess. It is absurd, for example, to see the demand for graduates in chemistry as independent of their knowledge of the subject and their ability to use it. Nonetheless, even in this case, there may be a screening element both in terms of degree classification, and the wider abilities that experience of and success in universities may indicate. This leads on to a more general point that is often neglected. Whether as filters or as providers of skills, institutions of higher education may be quite efficient. Industry may prefer to recruit its chemists from universities partly because they do the job better, and partly because they do it cheaper. In addition, the functions of screening, training, and educating may all be joint: ie doing them together in a single institution may be superadditive compared with separating them.

19 One failing of Robbins and the post Robbins era is the inability to explain and justify the dominance of the continuous three years Honours degree course. It is particularly difficult to understand its timing (ie starting at 18 or 19 years-of-age) or its continuity. It seems obvious for most social science students, for example, that a whole range of benefits would flow from an initial year of work experience and a further sandwich element subsequently. Peston, M. (1979) The future of higher education, *Oxford Review of Education*.

20 This should not be taken to imply that the opportunity costs which economists argue are the only correct ones to be taken into account or that they are easily assessed and do not involve an element of subjective judgement. An example of the complexities of the problem arises in the case of overseas students' fees. This issue is confused partly because it is impossible to ascertain quite what the objectives of current policy are, also because there is no agreement on what benefits, if any, stem from the presence here of students from foreign lands. But, even on the cost side, there is no accepted measure of either the marginal or average costs of overseas students.

Reference may also be made to the valuable memorandum submitted to the Select Committee, *Costs in Universities and Polytechnics* Fifth Report, pp.668-670.

21 Consider, for example, the tone of the evidence given to the Select Committee by the Committee of Vice-Chancellors and Principals. Fifth Report, pp.85-99. Although they do not go as far as the statement in the text, they do not appear to give any kind of primary role to the needs of the economy.

22 Compare our earlier remarks on the imperfections of the labour market. Substitutability of qualifications in a world of uncertainty is not solely a measure of resource misallocation. It may be necessary, and on the grounds cited in the text, even desirable.

23 Referring to the work of A. Freiden and R. Staaf ((1973) Scholastic choice: an economic model of student behaviour, *Journal of Human*

resources Summer), Blaug remarks: '(they) manage to successfully predict the pattern of subject changes by students in a particular American college, not by involving the theory of human capital, but by applying the standard theory of human behaviour.' (Ibid, p.835)

24 Peston, M.H. (1976) The education of vice chancellors, *New Universities Quarterly* Spring.

25 '. . . Instruction in skills suitable to play a part in the general division of labour. . . . We deceive ourselves if we claim that more than a small fraction of students in institutions of higher education would be where they are if there were no significance for their future careers in what they hear and read; and it is a mistake to suppose that there is anything discreditable in this.' (*Higher Education, Report of the Committee under the Chairmanship of Lord Robbins* (1963) London: HMSO, Cmnd. 2154, para. 25)

'. . . Not far from the surface of most candidates' minds is the tacit belief that higher education will go far to guarantee them a better job. All expect it to prepare them to cope more successfully with the problems that will confront them in their personal, social and working lives.' (*Education: A Framework for Expansion* London: HMSO, Cmnd. 5174, para. 107)

See also Williams, G. and Gordon, A. (1977) *Attitudes of Fifth and Sixth Formers to School, Work and Higher Education* The Institute of Research & Development in Post-Compulsory Education, University of Lancaster.

26 'We therefore recommend that higher education institutions should be encouraged to listen closely to such messages as can be derived from the employment market . . . .' (Fifth Report, para. 39)

27 'We therefore recommend that through the Unit for Manpower Studies, and as envisaged in the Government's reply to the 1972-73 Expenditure Committee Report, the Government should publish information about employment trends for use by pupils in the schools, their parents and their teachers.' (Ibid., para. 41)

28 Catto, G., Goodchild, A. and Hughes, P. (1981) *Higher Education and the Employment of Graduates* Unit for Manpower Studies, Department of Employment: Research Paper 19, Annex B. This admirable study, limited though it is by paucity of data, is indicative of the kind of research foundation which is feasible for sophisticated manpower planning.

29 Ibid., Appendix C.2.

30 On many of these matters see the evidence submitted to the Select Committee: Fifth Report, Volume II. See also Bosworth, D. and Wilson, R. (1980) The labour market for scientists and technologists. In Lindley, R.M. (Editor) *Economic Change and Employment Policy* London: Macmillan.

31 '. . . The Government have sympathy with the sincere desire on the part of a growing number of students to be given more help in enquiring and discovering how to apply knowledge and skills related more directly to the decisions that will face them in their careers and in the world of personal and social action.' (*Education: A Framework for Expansion* para. 108)

'While we see strict limitations to the power of what we call "supply-push" measures, we by no means discard them. We were particularly anxious

(i) that school pupils and, in particular, girls were encouraged to retain the *option* to follow an engineering course until they were old enough to reach well-informed and reasoned judgements about their future careers, and

(ii) that they were properly *informed* and aware of the challenges and attractions of an engineering foundation and of the career opportunities which it opened.' (Finniston, M., Evidence to Select Committee *Fifth Report* p.491)

32. Blaug, M. *An Introduction to the Economics of Education* Chapter 5.

33. Another way of putting the problem is in the form of the following questions:

i Do employers know what they want?
ii Is employer demand the only criterion of national interest?
iii Can employers signify what they want through the market?
iv Can prospective employees interpret the available market signals correctly?
v Can and do higher education institutions respond directly to employers, employees, and the market?
vi What other bodies act as forecasters and initiators of demand and supply?

Within all of this it is vital to distinguish short-run signals from long-run ones. Presumably, planning is mostly to do with the long run, but this is the set of circumstances in which signals are most distorted by noise, if they exist at all.

34. Here again, these conclusions are very much in accord with the recommendations of the Select Committee.

35. While recurrent education has not been a central theme of the present paper, this should not be taken to imply that it is not regarded as a major issue of education and manpower planning in general. Peston, M. (1981) The finance of recurrent education: some theoretical considerations, *Public Choice* (forthcoming).

36 '. . . At the end of the day a university will be very much driven by the standards it wants in its teaching and its research and its scholarship.' (Merrison, A., Evidence to the Select Committee *Fifth Report* p.86) '. . . It is very important that universities or large colleges of London University, say, should have more contact in one way or another with the outside world. The charge of being ivory towers is not altogether illfounded, and, in my experience at any rate, outside contacts of one kind or another can be of inestimable value to universities.' (Lord Robbins, Ibid., p.431)

37. It should be added that included in possible reforms would be the introduction of methods of financing which enable individual universities and within them individual departments to respond to demands and national needs. The present rather messy system could be reformed both towards more decentralization allowing insitutional response, and more centraliza-

tion allowing more rational intervention to deal with specific unsolved problems.

6

THE CHALLENGE OF MARKET IMPERATIVES

by Robert M. Lindley

The British higher education system has never really come to grips with the role it might play in economic development. During the 1980s it must surely do so: prospects for employment and for government spending on higher education suggest that this is both desirable and probable. Previous chapters in this book have dealt with major topics concerned with higher education and the labour market. Earlier versions of these chapters were discussed as papers at the first Leverhulme seminar and this final chapter brings together the main themes which emerged from both the papers and the discussion.[1]

The seminar aimed to provide guidance to later seminars on a number of issues related to the labour market rationale for changes in the higher education system. The evidence it discussed and the views which emerged from it will be taken into account in subsequent seminars where other issues of importance to the future of higher education will be investigated.

It is worth noting at the outset some general points brought home by the very nature of the subject and the seminar discussion itself. First, the lack of adequate statistical information is a major impediment to answering a number of quite basic empirical questions. Such uncertainty usually encourages stronger criticism of new proposals than of the existing system because some evaluation of them is automatically required, because they tend to be subject to more rigorous criteria, and because the assessment of them is often based on poor information leading to very tentative forecasts of their possible effects. Second, by virtue of it being the first in the series, this seminar could not benefit from the findings of others. As a consequence there were a number of occasions when it was clearly felt that conclusions should be subject to strong caveats about the feasibility of making the institutional changes envisaged and about their overall implications for the higher education system. Third, the participants were drawn from a variety of backgrounds from within higher education, industry and government, and in the course of a single seminar it would be unrealistic to expect them to reach firm conclusions on the complex issues discussed. Fourth, the focus of the seminar was on strategic questions concerned with the longer-term development of the system rather than on how the system should negotiate problems of resource allocation under sharply imposed expenditure cuts. But the point of departure affects the time-scale over which change can be planned and the transition costs are likely to be incurred. Even abstracting from the Government's stance on public expenditure generally and its particular restraints on higher education, we are still left with an economic environment which is likely to be one of high unemployment for the rest of the decade. So, however keen we are to adopt a long-term perspective on policy, any vision of two or more decades of development is going to be severely tempered by knowledge of the more than 'recessionary' condition of the economy during the 1980s. Finally, for many people professionally concerned with higher education, the labour market orientation of the system has become the big issue. Some even believe that a proper consideration of it might yield a new guiding principle for the development of higher education during the next two decades. The principle might be resented but it would be there to provide a way out of present uncertainty. This is an illusion. It reflects a lack of understanding about the way the labour market works and represents a rather simplistic reaction to realizing that the Robbins principle is no longer a prescription for the continued growth of higher education. Such naive expectations deserve to be disappointed but this will be little comfort to those who hold them. The seminar became increasingly conscious of the need to establish a better sense of perspective.

THE SEARCH FOR MORE STUDENTS

Disappointment at the drastic reduction in the growth of higher education during the 1970s has been deepened by the fact that the decade opened with the publication by the DES of the highest of all official projections of the numbers of qualified school-leavers who would be seeking entry to the system by the end of the decade.[2] This further upward revision of the Robbins projection envisaged 50 per cent or 280 thousand more students in 1981 than in the original projection. Much has been said of this misguided extrapolation, which was made at roughly the time when the rate of growth in the percentage of school-leavers with two or more 'A' level passes had reached its peak and, in effect, assumed that this rate of growth would continue. In 1981 the number of full-time students in higher education is in fact lower than the Robbins projection of 558 thousand.

There has, therefore, been a major change in expectations within higher education and amongst ministers and civil servants. Accompanying this change have been criticisms from groups outside higher education, notably employers, of the system's lack of response to the needs of the economy both in terms of satisfying its requirements for highly educated manpower and helping to sustain technical progress on a par with that of other countries. These attacks vary greatly in sophistication but, as described in Chapter 2, some are sufficiently credible to be taken seriously inside higher education as well as outside. Beyond expressing employer dissatisfaction with graduate output, they seem to provide a partial explanation of the past slow-down in the growth of *student* demand and a gathering of storms ahead of certain areas of the system. On top of this, doubts have been expressed about the ability of the present system to handle the public expenditure cuts planned for the early 1980s in any decisive fashion, for example by preserving strong dynamic areas rather than spreading the misery around more evenly and risking stagnation.

Thus there is now an apprehensiveness within higher education born of disquiet about the situation which has developed during the 1970s and reinforced by the pain of exposure to expenditure cuts and the knowledge that, with stable age participation rates, demographic changes will reduce the number of full-time students to about 70 per cent of the present level by 1995.

The atmosphere has provoked both a search for a new faith to which the higher education system can cleave — one which will deliver it from its present predicament — and defensive criticism of any specific proposals because they involve transitional problems. The need for a hard-headed appraisal of where future demand is going to come from is now, however, self-evident. Aside from questions about shrinking cohorts of full-time students in the traditional 18-22 year-old age group, we must ask what prospects there are for stimulating demand through attracting part-time students, providing post-experience vocational courses for those who have already studied to degree level, meeting the needs of mature students without previous experience of higher education, and more generally extending recurrent or continuing education to the already highly educated. Even more radically, what prospects are there for stimulating the demand by young people and adults for courses at sub-degree level in institutions of higher education? Some doubt was expressed during the seminar about the quantitative significance over the next decade of these potential sources of new business for our educational factories. In the first place there was scepticism about whether the *supply* of such programmes would materialize without substantial investment in restructuring the system and whether the *demand* would suffice to warrant the setting up of many of these types of course without recurrent subsidies to institutions, students or employers. So while many of these options would enrich the sytem, adding variety to what it offers students and employers, it is of crucial importance to ascertain the potential scale of demand.

Here the search for new sources of demand seems to connect with industrial criticism, for surely the latter implies that the former can be found to some extent through a closer scrutiny of labour market requirements. Narrowly speaking, labour market considerations should then matter to the higher education system because they provide *part* of the reason why students seek entry and why governments have continued large subsidies on both supply and demand sides. Whether these groups' perceptions of the value of higher education depend on the myth or on the reality of the labour market, our universities, polytechnics and other institutions can hardly afford to ignore them. Since employers not only influence the objective conditions in the labour market but also influence students and government and provide direct finance for certain areas of higher education, their perceptions must also be taken into account.

It is for the seminar on 'demand and access' to investigate the factors which determine educational choices and to establish how satisfied are those seeking access to higher education with the educational and careers advice offered and the opportunities made available by the various institutions. Among other things, we hope to learn from that seminar the extent to which young people are informed about the implications which different educational choices have for their future employment and income. A considerable part of the criticism of the educational system has been aimed at the pattern of student demand itself. If young people do not wish to enter courses in higher education leading to careers thought to be crucial to industrial recovery, a variety of explanations is put forward: the narrow class base of higher education, early specialization and later inflexibility in the system, the bias of schools towards conventional academic subjects, bad careers advice, general hostility towards industry, etc. If then there is much truth in the argument that the perceptions of aspiring students are distorted earlier on in the education system we might consider a strategy operating on two fronts. Remove the causes of distortion to the demand for higher education and, just in case this proves to be an intractable problem or takes rather too much time, prevent the higher education system from legitimizing the 'undesirable' pattern of student demand through supplying courses which aim to satisfy it. The latter may be done by restricting more directly the supply of places on certain courses and/or by varying the financial conditions under which courses may be followed.

Such labour market induced restraints on the system are hardly a recipe for maintaining the level of demand. Instead, they risk reducing demand even further by adjusting the pattern of subject provision to meet some notion of economic need only to find that the new opportunities are not sufficiently attractive to students. Certainly we should not expect the innovations in course structure and content mentioned earlier to involve the same sort of risk but some would simply offer substitutes for existing courses. Their emphasis would be upon improving the quality and efficiency of higher education: this may itself increase demand (or reduce the rate of decline) but that is not the main objective or expected outcome. The problem confronting higher education is that those proposals for development which might be legitimized by manpower considerations tend to imply redistribution within the system rather than expansion of resources. This was accepted at least implicitly in the discussion of employers' demands and more explicitly in the case of highly qualified technological manpower. It seems that proposals most likely to lead to higher numbers of students can only be justified on economic grounds rather tenuously and, indeed, in some cases are undermined by reference to labour market effects. For example, it is clear that the strength of internal labour market pressures and the structure of the professions militate against the career prospects of mature students, whether they are seeking to obtain higher educational qualifications for the first time or to enter a new area of study and subsequent employment. The general labour market situation envisaged for the rest of the decade is also likely to discourage those in employment from giving up their jobs in order to devote themselves to full-time study.

There is then a suspicion that however innovative and responsive the higher education system tries to be over the next decade, the prospect is for shrinking demand unless government steps in with levels of expenditure perhaps even greater than those which have recently been subject to cuts. It remains for the Demand and Access seminar to confirm or question this view.

TANGLING WITH THE LABOUR MARKET

At a time when the labour market situation can be seen to contribute to the harshness of the environment faced by higher education we might reasonably ask whether employers can really do no more than offer up more exacting standards by which its institutions should be judged. Let us first review the main points which were highlighted during the seminar and on which there appeared to be a broad consensus.

First, there have not been major demands for highly qualified people, as expressed by employers, which have remained unsatisfied in the quantitative sense. The labour market works in a fashion and there are few clear-cut cases of market failure in which skill shortages have persisted and can be seen to have acted as a vital constraint on economic activity.

Second, this general judgment must be qualified in three particularly important ways: (i) it is an ex post assessment which ignores possible opportunity costs incurred by the economy when, for example, firms have internalized manpower constraints by substituting alternative skills; (ii) in the qualitative sense there do appear to have been significant problems — these involve the relative abilities of people undertaking different courses of higher education, the adequacy of the training they receive for subsequent employment, and the efficiency with which they are used by employers once qualified; (iii) at the disaggregate level, where concern is not so much with broad groups of educated people, like qualified scientists or engineers, but with more specialized fields, there is (as we might expect) more evidence of mismatches persisting for want of flexible arrangements for supplementary training or retraining.

The third point of consensus stemmed from the observation that, whilst it may be the case that there is little evidence of the higher education system having failed in any dramatic sense to respond to the market, the market conditions themselves reflect the disappointing performance of the British economy. Perhaps, as one industrialist observed, 'academics are their own worst critics' but, 'if it's all so fine, how come we ain't rich?' asked an academic participant. And that seemed to reflect an unease shared by many at the seminar. If higher education matters, and a majority of the country's leaders and professionals in industry and government service have passed through the system, then our universities and colleges must bear some of the blame for the malaise from which we suffer (however far back those with a taste for economic history care to place its origin). More positively though, should we not expect our institutions of higher education to play their part in the reform of Britain's economic and social structure? The seminar did not engage in the rhetoric of political and industrial regeneration. Its concern was more subtle than that. The feeling may, perhaps, be summarized as follows: The higher education system has not itself starved the economy of crucial skills in the past and we suspect that prospects for the economy in the 1980s at least are not sufficiently buoyant to raise the probability of this happening in the future. But the seriousness of the industrial situation seems to call for a more dynamic response from the higher education system as much as from other institutions.

This brings us to the fourth point of consensus to emerge. Having decided that the higher education system and the labour market did not work too *badly* in conjunction with each other it was a natural step to ask how *well* they worked together. This question relates to the quality of information transmitted between educational and labour market institutions or provided by third parties and their responsiveness to that information. For the moment we shall concentrate on the former. Little concern was expressed about the information provided by the higher education system about its own past and expected future developments although this topic will arise later in a somewhat different context. There was, however, a strong consensus over the poor quality of labour market information and the neeed to improve it. From previous chapters and evidence presented to the House of Commons Committee on Education, Science and the Arts, it is clear that there has been a marked failure by successive governments to collect adequate information on the employment, mobility, earnings and other conditions of employment experienced by those educated to advanced levels. So our background understanding of what has happened in relevant labour markets is severely restricted by the lack of appropriate statistics, and this affects our ability to promote a common appreciation of the main trends and the nature of past problems. Without this shared understanding, the operation of the labour market is likely to be hampered because employers, employees and various agencies of government lack a strong foundation on which to build their assessments of potential future difficulties. In the absence of that background it is not surprising that the seminar should identify a lack of coherence in the labour market views expressed by employers. It was recognized also that there is a tendency for firms which cannot attract skilled personnel to pass the blame to the education system for not having produced enough graduates or for having produced graduates with the wrong mix of skills and/or experience or for having failed to attract on to their courses students of higher ability. Moreover, as one participant with extensive knowledge of company manpower policies stressed, there are as many different interest groups amongst employers as there are connected with education and they are inclined to highlight different aspects of the problem.

Our attention was drawn by the evidence reviewed in Chapters 2 and 3 and supplemented by other participants to the considerable reluctance of employers to face the difficulties of adjusting salary structures to cope with problems of recuitment, although starting salaries for graduate intakes may be more susceptible to market pressures than is often appreciated. Overall, the case of engineers provides an example in which employers appear to persist in the belief that bidding up salaries will be self-defeating because the supply is strictly limited. Yet many trained engineers (and scientists) eventually pursue occupations not requiring their specialist knowledge. Too much can be made of that fact alone but, in addition, employers express concern about the general ability of recruits and the ultimate impact this might be having on industrial performance. If firms cannot contrive to raise the status and pay of engineers it is arguable whether the higher education system can do much to increase the supply of more able and suitably qualified graduates willing to remain in engineering occupations. To help to avoid this kind of stalemate, it was agreed that a much better framework for monitoring labour market developments should be established.

Against this background it is now worth returning to consider the question posed at the beginning of this section. Can employers do no more than exact higher standards from the education system? In the first place, if the higher education system is to become more responsive, which of the existing and sometimes conflicting signals given by the labour market deserve most attention and is it possible for employers to clarify the message? In the main the seminar took a fairly pessimistic view of the extent to which employers individually and as a group were capable of forecasting their demands for different types of skilled manpower. It is probably true, however, that with the better basic information advocated above and within the framework of a rough medium-term forecast of the economy, dealing with employment in different sectors and occupations, the expertise which employers possess could be used far more profitably than has been the case in past attempts to sound their opinions, usually through ad hoc surveys. As it is, the lack of consistency between the actions of employers and their expressions of concern, together with the large fluctuations observed in the graduate recruitment intentions of firms individually and collectively, suggest they could help first of all by adopting more sophisticated views of the labour market and improving their manpower planning. Otherwise the higher education system might well conclude that, for example, if the problem of quality amongst engineers is not sufficient to force employers towards a major reappraisal of their salary and career structures then firms deserve what they get.

The prospects seem bleak for a radical autonomous improvement in the responsiveness of *employers* to imbalances in the labour market so as to enable the higher education system to play a more supportive role. One or two participants took a fairly relaxed view of this. Fluctuations in demand will occur, employers will complain and that is the very stuff of labour markets. There will be a few persistent problem areas but nothing that should lead us to shake the foundations of the higher education system. It was also observed that the market for highly qualified manpower — in which the supply of educational opportunities is influenced by employers only at the margin — has performed no less effectively than has the market for skilled craftsmen — where supply is mainly under the control of employers. But that still seemed insufficient to spread a general sense of satisfaction. There remained a range of opinion about how well the market works if it does not work badly. After some discussion, this range appeared to be related more to differences in judgements about what constituted a significant degree of market responsiveness. Disagreements over the evidence for poor mobility, salary rigidity and supply/demand mismatches were of secondary importance. There was the germ of an idea that perhaps, in relation to the development of human capital, the labour market is too important to be left to employers, trades unions and professional bodies, just as much as higher education is too important to be left to its academics and administrators. There are many practical difficulties in stepping in to 'rationalize the market place' but as with national training policy there are equity *and* efficiency arguments for some form of intervention by government. That might have led us to consider how employers could be 'helped' to clarify their message if much improvement was not to be expected otherwise. And we should then have been quite close to asking how the underlying message itself might be modified in the light of 'national needs'. Certainly the collection of better statistics and the publication of commentaries on the labour market situation would go some way towards improving the diagnostic skills of employers. But only the behaviour of government as the major employer of highly qualified manpower and in failing to pursue an appropriate policy on science and technology was specifically mentioned in the context of influencing employers to pursue strategies consistent with national economic welfare (see Chapter 3). Both proposals involve government taking the initiative: in the first case, by establishing a monitoring agency — thereby facilitating the adoption of better manpower policies by firms — and, in the second case, by adopting better manpower and related policies itself.

In the present economic circumstances facing employers, it is understandable that no suggestion emerged for government intervention by means of the stick rather than the carrot. It was evident that the seminar envisaged a rather more peaceful kind of 'engagement' between industry on the one hand and government and the education system on the other. Ultimately, any balance in the relationship between the education system and the labour market depends upon how the responsibility is shared between the two for dealing with the many fluctuations which can occur at the margin of the demand for particular skills, whether it is for new graduates or for people with different mixes of education and experience. Higher education may be reorganized to place a premium upon flexibility in course structures with modular degrees, opportunities for part-time study, further development of post-experience courses, etc. But if such initiatives are to gather momentum greater co-operation will be necessary between educational institutions and employers in which the latter accept some responsibility for stabilizing the labour market environment so that innovation in higher education is seen to be a more worthwhile strategy.

Before deciding there should be a new system of incentives to bring about 'closer working relations' of this kind, it is time to shift our attention from the behaviour of employers to the reaction of the higher education system.

THE EDUCATIONAL RESPONSE

As Maurice Peston has stressed in the previous chapter, a distinction must be drawn between providing much better labour market information on which the different interest groups could base their decisions and government using that information to put pressure upon the education system to follow a particular pattern. The first point to be settled then is whether or not information can be improved enough for this in itself to have significant benefits through its effect upon decision making, without much further government intervention. We have already noted the conclusion reached in respect of employer behaviour and it is intended that the Demand and Access seminar will shed some light on the possible effects of better information upon the choices made by potential students.

Some may believe that merely by introducing, for example, student loans or a graduate tax, it will be possible to concentrate the minds of future students upon the economic returns to alternative educational choices. They may go further and presume that the resulting choices will match the demand for highly qualified manpower to a degree that removes the need for government influence on the subject pattern of the supply of places. Whether or not such a fortunate outcome would materialize would depend not only on the behaviour of individuals and educational institutions but, as we have stressed, also on that of employers. A general impression gained from the seminar was that the provision of better information, even if accompanied by changes in financial support for students, would only have a marginal effect upon the pattern of demand, given the present structure of the education system. But how large is 'marginal'? It might be all that employers require for, as every economist has argued at some time, it is only necessary for a minority of agents in a market to be responsive to price changes to produce 'marginal' activity which generates every sign of competitive market behaviour. One participant thought that the minority was not as large as that but the rest were evidently glad to leave the final judgement to those attending the Demand and Access seminar.

Students, of course, are not the higher education *system*. However alert they might be to changes in relative salaries and job opportunities their intentions could be frustrated by educational institutions which 'possess monopoly power, are creators of demand, and are slow to respond to independent changes in demand.' Maurice Peston makes that statement (Chapter 5), though, after stressing the extent to which academic departments do seek out student demand and try to satisfy it. Laurence Hunter notes (Chapter 2) that 'on the available evidence, it seems quite certain that the problem of alleged shortages cannot be attributed to a lack of higher education places, but rather to a lack of take-up of places.' But he also follows up with a firm caveat (see below). And not for the first time in the seminar is it someone with an industrial background who feels the whip is being cracked too hard across the back of the higher education system: 'the academic world has called the bluff of industry in preparing courses.'

What emerges from the three British papers and was taken up frequently in the discussion is the need to encourage the provision of supplementary courses of considerable variety to meet the labour market's requirements. Where shortages arise there is often little hope of the mainstream first degree system being able to assist, except through providing a good foundation on which additional higher education/training can be based.

The complexity of the labour market structures faced by institutions of higher education is clearly shown in Chapter 2, which describes the different arrangements for linking academic study with the practical training offered with varying degrees of conscientiousness by employers and the roles played by professional bodies where they exist. Attempts by the higher education system to provide a greater amount of postgraduate or post-experience training will need to contend with this variety of circumstances. In some cases employers' criticisms can be directed more at the academic standards laid down by the professions than at the academic themselves. In other cases criticism may reflect the employers' own unwillingness to provide graduate recruits with industrial training as opposed to industrial experience or to maintain a steady supply of industrial placements for sandwich-course students. The growth of business studies provides some indication of the difficulties which arise even with collaboration on the scale which existed between the UGC and the Foundation for Management Education and within a much stronger economic environment than could possibly be hoped for during the 1980s. If the maximum is to be wrung out of the potential demand for supplementary courses of vocational higher education the system must employ resources on a much larger scale than the useful but small programmes started, for example, by the UGC and the SRC in the areas of engineering and technology or mounted in a variety of fields on the initiative of individual departments or institutions. So, as Laurence Hunter has emphasized, 'despite a good deal of activity within the system . . . the change was not sufficiently widespread or radical to effect the necessary alignment with what industry was providing in the way of post-experience training.'

Several seminar participants evidently felt that desirable innovations of this kind and others breaking less with the academic teaching tradition (such as the DipHE) were being frustrated by the national and internal institutional modes of planning and finance. As noted already, however, there was an even-handedness in the way in which the deficiences on both sides of the divide were discussed which is well summarized by Laurence Hunter in his chapter.

> 'There seems no point in attributing blame for these deficiencies either to the higher education sector or the employers. Perhaps the fairest conclusion to draw is that the institutions of higher education and the employers have not got together sufficiently to determine an effective means for carrying the student through a degree course *and* the subsequent training stages . . . . The evidence would seem to be that over a wide range of employment in the last decade this has not happened.'

So the higher education system cannot be cast as the villain of the piece after all but its complicity is clear enough. The litmus test of its willingness to help improve the preparation of our highly qualified manpower would seem to be how much it manages within the present system to collaborate with employers not so much over first degree curricula and course structures but in the provision of supplementary courses for an older age group. If this cannot be achieved within the present financial and administrative framework, the seminar has unearthed enough evidence to justify changes in the overall framework itself.

THE OTHER FACES OF HIGHER EDUCATION

As if to feed the fears of those who already hear the tramp of Philistines across the educational landscape, this section is the shortest. It will also dwell not upon the higher aims of higher education but upon the undercurrents which occasionally threatened to sweep discussion along but did not in the end determine its direction. The seminar did, inevitably *touch upon* the extent to which higher education (a) increases the productive potential of the labour force, (b) provides a means of screening applicants for certain jobs, (c) enhances the cultural life of the nation, (d) provides finishing schools for the better-off sections of society, and (e) provides a major channel for social mobility. Taking into account the possibility that people who do not themselves enter higher education may, nonetheless, ultimately benefit from the fact that others do, we are then confronted by the question: have these outcomes justified the cost to society? In particular, (a) do individuals and employers exploit sufficiently the greater productive potential created (or the capacity for creating it), (b) are there more efficient ways of screening applicants for jobs, (c) are there more effective ways of promoting cultural life, (d) should the better off (and potentially better off) pay more for the privileges conferred by higher education, and (e) could not greater social mobility be achieved through concentrating upon the educational and training opportunities open to *all* 16-18 year-olds rather than bright 18-22 year-olds.

All these questions matter but, given the focus of the seminar, most comment related to (a) and (b). Part of the discussion concerned not the relative merits of the human capital and screening theories (see Chapter 5) in explaining aspects of behaviour connected with higher education but whether or not it was worth the effort to discriminate between the theories. It appeared that some economists were reluctant even to acknowledge that it is an important issue whether higher education mainly raises the productivity of the labour force or functions as a screen. These recalcitrants were in fact talking about the explanation of earnings differentials and not the function of higher education itself. On the main issue most participants were happy to acknowledge the sense of Maurice Peston's eclectic position: 'The human capital approach viewed as positive economics offers a coherent theory which throws light on a number of aspects of the demand for higher education. In practice in a country such as the UK it throws some but rather less light on the supply side. An alternative theory such as the screening approach also offers useful insight, and the two theories can be made to complement each other. Unfortunately when it comes to empirical testing . . ., the position is a great deal less clear. While it is too much to say that the theories have been refuted, they are not so well substantiated as to suggest that a more common-sensical, less formal theoretical, approach has been decisively refuted.'

So, the higher education system escaped the ignominy of being charged with providing only bad screening. Screening or 'credentialism' appeared in various guises during the discussion, particularly when dealing with the implicit effects of vocationally orientated higher education which actually fails to match the pattern of training and work experience received by the graduate when taking up employment. But the discussion served mainly to provide further illustrations for cases alluded to by Laurence Hunter and Derek Bosworth in their chapters.

MANPOWER PLANNING AS A PEJORATIVE TERM FOR SOMETHING SENSIBLE

Having got together numerous ingredients some participants were more tempted than others to try making the cake. The effects of manpower planning defined as the provision of better information were covered above. Would a more labour market orientated strategy than that cramp the existing style of higher education? Is it possible to see beyond the stage of providing better information and judge the extent to which government would interfere in a more concerted fashion than it does at present or change the ground rules in a major way so that the general effects of better labour market information would be reinforced by measures introduced to make the education system more responsive to it? In the former case, for example, the government might manipulate the basic student grant in conjunction with supplements attached to certain courses and lean on the UGC and the LEAs to support the concomitant changes in educational provision. In the latter case the government might choose to change the financial arrangements so that both students and institutions are much more exposed to economic pressures, and then leave the system to operate without much intervention. Both these options (which are not, of course, clear-cut alternatives) presume that the manipulation of costs and of the pattern of provision would offer enough scope for avoiding significant mismatches between the demand for and supply of highly educated manpower. This would require employers to operate through the market mechanism, for example, by supporting their assertions about labour shortages with appropriate changes in pay and other conditions of employment.

Mark Blaug has observed with some scepticism the periodic flirtation which the educational bureaucracy has with manpower planning.[3] Would it be emboldened to act more decisively if it were better informed? It is easy to underestimate the debilitating effects upon policy making of a syndrome which permeates the educational and manpower fields. As noted by Maurice Peston, this is the tendency to be satisfied with the 'once for all acquisition of some facts'. Scepticism about the value of manpower forecasting on technical grounds has all too easily been expressed. The lack of data is not a technical problem but an implicit choice in favour of ignorance about where we are and where we have come from. Forecasting where we might go to is difficult but useful and it was thought that significant improvements could be made in the quality of manpower assessments were more adequate statistics available. The seminar implicitly agreed that not only was regular monitoring of the links between higher education and the labour market desirable but this would be likely to lead to a more concerted attempt to intervene when problems arose. Problems *might* not arise so often if employers and potential students were to share in this information bonanza but such improvements were likely to be limited given current institutional arrangements. This implicit agreement was somewhat masked by explicit disagreement about how to improve upon what might be called 'muddling along more rationally with the present system'.

The questions at issue are whether or not greater responsiveness might be achieved within the present framework and what might the practical implications be. To some extent the answers will depend upon perceptions of the policy-making process itself: ie what is the present 'framework' and what changes would consititute a major reform as opposed to a modification of it? But essentially we need to know how further steps might be taken in the direction of 'manpower planning' and at what point they would begin to call for significant changes in the accountability of educational institutions, the criteria by which their performance is judged, the means by which they acquire income and the control they exercise over expenditure.

This then brings us to conceptions of 'manpower planning' which go beyond providing better information. It should be stressed that the caricature of manpower planning as a technocratic activity of the worst kind, a sort of number-crunching approach based on very poor data, was not seriously defended or attacked during the seminar. The term 'manpower planning' does, however, suffer from its association with the cruder ideas about education and economic development advanced especially in the 1960s. To some educationists it has become a term of abuse to be applied even to quite modest proposals for government intervention as if they are draconian attempts to subordinate higher education to the demands of the labour market. What *was* put forward during the final session of the seminar amounts to a more radical change in which manpower considerations play a part but do not assume the significance attached to them in the usual notion of 'manpower planning' if applied to the present system of higher education. There was general agreement that better information would help to reduce mismatches between supply and demand but that such gains would be rather limited without institutional change. Some participants saw scope for strengthening the existing institutional framework and others saw substantial benefits resulting only through fundamental change towards a more decentralized system. Both groups were minorities and those in the first group were largely reacting to the case developed by the second. The majority seemed reluctant to embrace the case for decentralization: they wanted to know much more about how it might work in practice before committing themselves. Nonetheless they sensed that there was a potential for greater responsiveness to the demands of students and employers and that this was not being realized through the existing institutional framework. Later seminars will be able to shed some light on whether the potential does exist to any considerable degree and to what extent both potential and actual responsiveness might be increased by changes to the framework. The seminar as a whole did, however, accept that, although we know a great deal about the numbers of students passing through different sectors and courses of higher education, information about the costs of establishing and maintaining different courses has not been collected and deployed systematically enough to support decisions about the pattern of educational provision. Whether 'modifying' or 'reforming' the system, the calculation of costs would act as a spur to the identification and elucidation of benefits and more rational discussion of policy both at national level and in individual institutions.

The last point raises a more general issue which is also part of the manpower planning debate. Some concern was expressed about the difficulty of establishing appropriate measures of costs and about the inflexibility built into the system which would frustrate attempts to respond to changes in costs and demand even if we were able to monitor them effectively. Manpower planning as a guiding principle for higher education would undoubtedly impose greater strain upon individual institutions which, as employing organizations, must have their own 'manpower plans'. Yet the traumas now being experienced by institutions of higher education are not so great when compared with those faced by other employing organizations. Nor are their problems of adjusting to changing market circumstances any worse than those experienced by some areas of industry. The estimation of costs and setting of prices by firms in both the public and private sectors is also by no means a straightforward matter. It is not, therefore, on these grounds that we should be cautious about subjecting our universities, polytechnics and other colleges to market forces. 'Downward rigidity' is a characteristic shared with many industrial organizations rather than a special reason for adopting a paternalistic system for funding and organizing higher education.

HIGHER EDUCATION AND WHICH MARKET?

Care is required, not only with the term 'manpower planning', but also with 'the market'. There is in particular a tendency to blur the distinction between the labour market and the market for educational opportunities. The latter derives much of its motivating force from the former but the difference between them is important on grounds of both political economy and public administration. Furthermore it is desirable to distinguish between managing the market for educational opportunities and managing the higher education system itself.

The market for educational opportunities involves those who influence the supply of courses in higher education and those who influence the demand for places on those courses or for opportunities for study which have yet to be catered for. The composition of this market overlaps that of the labour market to a considerable degree. We must allow them a separate identity, however. In particular, higher education policy is concerned *partly* with how the market for educational opportunities should be organized in order to promote the well-being of its participants and the contribution they can make to the development of the economy. That contribution is seen most directly as the support which can be given to the labour market in its rough and ready attempts to allocate existing skills and stimulate the accumulation of new skills. We have seen how this requires, in effect, a quid pro quo from labour market institutions such as employers, professional bodies, trade unions and government. Certain labour market mechanisms must operate effectively if changes in educational policy are to have the desired results. It is conceivable that the labour market response itself might be undermined by injudicious manipulation of the supply of new skills through higher education policy. But the problem is more likely to be that the manpower objectives assigned to higher education policy will be frustrated by lack of attention to the labour market environment.

With these points in mind, it is probably fair to say that most participants were in favour of the following objectives:

i To try to achieve a more stable and rational labour market environment so that the signals transmitted to the market for educational opportunities are clearer guides to decision makers and advisers operating there.

ii To provide incentives for both sides of the market for educational opportunities to respond to those signals and to adopt strategies to reduce the effects of uncertainty that will still remain after aiming for (i).

Before dealing with the more contentious part of the discussion it is worth bringing together a number of points which have been made separately in earlier chapters, were emphasized during the seminar, and bear on how we should try to achieve a more stable and rational labour market environment. We have already noted the view that government should much more clearly recognize the special role it has in the labour market for scientists and technologists through its potential influence upon research, design and development activities, and investment in both public and private sector enterprises. This role extends beyond its actions as a major employer of highly qualified manpower. Chapters 2 and 5 referred to the difficulties of determining appropriate levels of pay and related conditions of employment for the highly qualified, a large proportion of whom are engaged in the government sector per se, public corporations, other enterprises heavily dependent upon government for sources of finance, or professions regulated with varying degrees of government involvement. The failure of successive governments to establish coherent policies for pay and employment in the public sector creates a background which is unfavourable to the development of labour market policy at a more general level. This, in turn, undermines attempts to inject an economic rationale into discussions of policy which focus on the highly qualified, whether employed in the public or private sectors.

It was of course beyond the scope of the seminar to discuss labour market policy in a comprehensive way but enough was said in relation to highly qualified manpower to underline both the importance of trying to rationalize the labour market and the difficulty of making headway.

A Proposal for Greater Decentralization

The main disagreement was whether or not it was desirable to pursue a more decentralized policy for the management of higher education subject to retaining powers to deal with problem areas either through discriminatory use of the system of incentives indicated in (ii) above or, as a last resort, through more direct controls. A number of doubts were expressed about this approach. The most frequently heard was that it seemed inherently both inconsistent and unrealistic because it relied upon decentralization and the use of central powers at the same time — the reply being that this was the standard approach of social engineering and figured in many areas of the country's economic management. A rudimentary model was then put forward embracing the present system but having a greater element of central power to improve responsiveness to the labour market (if thought to be desirable). This never acquired the status of the decentralization model but was a response to the challenge to be more constructive.

At least one participant felt that it was also inconsistent to decide that higher education had not failed the labour market but then to persist in discussing a potentially major reform. However, as described earlier, the former view was rather heavily qualified and, combined with the type of reform envisaged, implied not so much an inconsistency but a certain irony. In a sense, the scrutiny of higher education's performance in relation to the labour market was leading to a proposal for reform which was seen to be desirable on other grounds as well as those connected with the labour market. Indeed because of the nature of the labour market, the proposal was not expected dramatically to alter the scale and broad subject pattern of higher education. The kind of 'decentralization with reserve powers to intervene' that was being proposed would, it was argued, create conditions conducive to a more innovative and responsive system and this would mean that the balance among the institutions and among course structures within universities and colleges could alter significantly according to the success with which different groups of academics were able to promote courses. It was stressed that those who wished to improve the existing financial and organizational framework had agreed that there were aspects of planning and decision making at the national level and within institutions that seemed to discourage innovation and responsiveness. Whilst changes in the government of higher education would help to remove rigidities and reduce the power of certain interest groups it was suggested that the strategy should be to expose institutions more directly to the external stimulus of changing patterns of demand.

Here we must acknowledge that the seminar's focus prevented discussion from developing to the point at which participants as a whole felt able to judge which would be the best course of action. Indeed, this factor clearly inhibited those who questioned 'decentralization with reserve powers' from explaining more fully where they thought the existing system could be modified to most effect. Later seminars on 'institutional adaptation and change', 'structure and governance', and 'mechanisms of finance' will deal with such matters. What can be concluded from the discussion is that the feasibility and consequences of radical reform, in which competitive forces in the market for educational opportunities are given much greater rein, deserve thorough investigation.

The American Model

Another criticism of 'decentralization with reserve powers' derived not so much from the feeling that the labour market evidence did not itself warrant the effort of radical reform but from the view that participants had been carried away by the discussion of Richard Freeman's paper dealing with higher education in the United States. To some, this discussion seemed to portray the American system in the grip of exhilarating market forces, with student demand responding quite dramatically to changes in the labour market and the universities and colleges quickly reacting to new patterns of educational preference. For example, large swings in engineering enrolments were being treated as a sign of virility in higher education, rather than as an over-reaction by both students and institutions which could be conducive neither to the efficiency of the labour market nor to that of the market for educational opportunities.

On the other hand, it is most unlikely that the participants who were advocating greater decentralization had been influenced in this way because they were clearly familiar with the American situation and the research evidence long before this particular seminar. Moreover, to suggest that the 'decentralizers' were seeking to import the American system would also be wide of the mark. The dangers of over-reaction to circumstances in the labour market would provide grounds for central intervention as much as would the disappointments of under-reaction. This defence does, however, rather pander to a view of American higher education which exaggerates both the degree of competitive behaviour exhibited by its institutions and the unwholesome consequences of its more robust embrace of the language and logic of the market. Richard Freeman, himself, points directly to weaknesses in the American system, concluding: 'Because of the nature of the higher education market, there are reasons to believe that current and potential future adjustments to the changes in the market are far from optimal.' He argues for 'some form of planning for the future market situation, presumably in conjunction with the governmental bodies that subsidize so much of higher education.' Amongst the deficiencies identified are some institutional characteristics already mentioned in connection with British higher education and, at least in relation to the development of new courses and arrangements for study, the remedies offered bear a corresponding resemblance to those advanced in this country. Freeman is quite explicit about the potential for excessive adjustment beyond that required to reach a social optimum. But what is perhaps particularly revealing is the view that major difficulties arise because government financial support is channelled mainly through subsidies to institutions rather than to students. The market orientation of the American system is thus undermined significantly by this reduction in the influence which student preference could in principle bring to bear on institutions. Accompanying these arrangements for funding there are significant distortions of prices and costs faced by students and institutions. Freeman advocates changes in tuition charges to reflect more closely the costs of different courses or, where this is not possible, the introduction of quantitative constraints on certain, notably graduate, programmes. To some extent the latter bureaucratic intervention already happens but Freeman is concerned that 'University policies should be such that educational prices or allocation decisions reflect true social costs, no matter who pays.'

Critics of attempts to shift British higher education towards greater decentralization might well argue that if the Americans find difficulty in making the market work effectively in higher education there can be little hope for us. But our purpose was not to conduct a comparative study of the British and American situations. The evidence presented in Chapter 4 indicates that the higher education system and the labour market in the United States do not adapt so smoothly that mismatches between supply and demand are avoided, adjustment taking place imperceptibly. We are told that the downturn which took place during the 1970s in the labour market for highly qualified manpower produced reports of the unemployed teacher, the doctorate taxi driver and the graduate factory worker. However, we must remember that the resulting questioning of the economic value of higher education, to which Richard Freeman alludes in his paper, takes place in circumstances where 40 per cent of the relevant age group in 1975 entered some form of higher education, compared with about 20 per cent in the United Kingdom.[4] If the prospect was for a large increase in the British higher education system rather than a probable reduction, those who now resist arguments in favour of creating a more developed market for educational opportunities might take a more relaxed attitude. The pessimistic view of the future is, however, based on assuming that conditions cannot be created in which access to the system is widened very considerably and demand responds quickly enough to keep the momentum of expansion going.

The Shape of Future Policy?

The government's power to influence the labour market was the subject of earlier comment in this chapter dealing with the demand for highly qualified manpower and the determination of their pay and other conditions of employment. A major theme identified by the seminar can be related to the need for intervention at the *boundary* between the labour market and higher education. This concerns how employers and educationists should be encouraged to consider the production of highly qualified manpower as a joint effort involving elements of higher education, training by the employer and work experience. Thus it may be in the interests of the education system for some part of 'educational' expenditure to be used to reduce variations in employers' investment in human capital so as to create the conditions under which co-operation might flourish.[5] Such moves would accord with the view that the existing education system is not sufficiently responsive to the labour market but that imperfections in the latter call for more than policy changes to influence the individual demand for education and the way educational institutions react to it.

To suggest that policy should include measures to influence the pattern of training and recruitment of highly qualified people in this way may seem to offer a counsel of despair over making the labour market itself more effective. On the other hand, by recognizing the practical problems facing employers, such measures might provide non-profit-making bodies with a 'managed' market environment to which it would be reasonable to insist that they respond or perish. Some may prefer to see more violence done to the traditional rationale adopted by these institutions: others may be horrified even at the relatively mild notion outlined above as applied to certain areas of higher education. Most seminar participants sat firmly on the fence.

The development envisaged above would involve more than providing better information and/or subsidizing the training and recruitment of qualified manpower in order to secure a more efficient labour market. It would draw the employer into the market for educational opportunities as a partner with institutions of higher education in extending the supply of courses available to students in certain fields.

This sort of proposal would have important financial and educational implications even if it were to be introduced with the rest of the present system of financing higher education left intact. On the other hand it might be regarded as one of the ways in which a government could intervene in a more decentralized system. In both cases such a policy would be the hallmark of government attempts to make up for the deficiencies of the markets for labour and educational opportunities. But in the second case this attempt would also be accompanied by a radical change in the structure of the educational market. How could that come about?

If the second strategy is to be adopted, the incentives required in the market for educational opportunities must place a premium upon the flexibility of course structure at undergraduate as well as at postgraduate level and blur the distinction between the majority of present postgraduate courses and the post-experience short course. They must also reinforce the need for good labour market information to reach students and potential students and for the higher education system to react to their interests. This could only happen by gradully increasing the proportion of income that an insitution receives directly through the registration of individual students for courses. Arrangements for the central distribution and control of resources for institutions of higher education would have to be amended to bring them into line with the above proposal. The central agency would be charged with the additional responsibility of monitoring relevant areas of the markets for labour and educational opportunities and would be empowered to deal with major difficulties that might arise.[6]

Note that these proposals do not refer to the conditions under which the student is able to finance his studies (except for the implications of greater flexibility of courses), but state that his choice will carry more financial consequences for his institution than it does under the present system. The student is being provided with better information and more opportunities for adapting his education to various circumstances, including those of the labour market. A further step would be to alter the current system of student grants to strengthen even more the economic pressures on educational choices. The age, sex and social class composition of students in higher education could be affected by this, although not necessarily to the detriment of social equity. For example, at the same time as increasing the economic pressures felt by some groups, the pressures felt by other students or potential students might be reduced. The feasibility and effects of making major changes will enter discussion at the seminars on Mechanisms of

Finance and Demand and Access. Their conclusions will help the programme to decide whether or not this would be desirable in the light of the labour market considerations covered here and broader questions taken up more fully in other seminars.

ACCEPTABLE MARKET IMPERATIVES

Attempts to establish long-term strategies for education and training are beset by the problems of coping with the severity of the current recession and with uncertain prospects for economic growth during the rest of the decade. The Conservative government's aim is to create a bracing climate in which the economy will regain its vigour and flourish. If the reaction of industry to the outcome so far has been mixed, that of the education system has been distinctly hostile. While our universities, polytechnics and colleges grapple with the effects of various cuts in public expenditure, the temptation to retrench rather than think constructively must be very great. And long-term policies that place even more stress on the need for economy, adaptability and innovation seem to announce the end of an era in which the preservation of academic values in the face of increasing demand was made possible by an expansion of resources. Now there appears the threat of a decline in government funding which will outpace the expected drop in demand induced by demographic changes. So the resources of higher education will be stretched at the time of its greatest need to invest in new programmes.

We could, of course, spend more on higher education and less on geriatric care or Trident missiles. While invidious choices between desirable social objectives cannot be avoided by unlimited reductions in the defence budget, the trade-off exists and some might care to apply it. Whatever the total spent on higher education, it is reasonable, however, to ask whether the sytem is performing as well as it could. Prospective changes in scale invite questions about style and structure. It is important to the health and wealth of higher education for these questions to penetrate further than they have done during the 1970s.

It was quite evident from the seminar that participants thought that the overall scale of higher education should not be determined by manpower considerations. This should be settled on broader grounds than calculations of economic return. Leaving aside the crude versions of manpower planning from the start, the seminar was much concerned about the qualitative side of the relationship between higher education and the labour market. This reflected agreement that there had not been major sustained shortages of highly qualified manpower to date and none were likely to arise in the foreseeable future given the state of the economy. It was recognized that inefficiencies could occur when firms internalized particular manpower constraints by substituting alternative skills. In specialized fields the mismatches between demand and supply were thought to be of a kind that called for more flexible arrangements for supplementary training or retraining rather than attempts to link graduate output closely to projected changes in the demand for different skills. More generally, the qualitative problem concerned the relative abilities of students on different courses, the adequacy of the training they receive for subsequent employment and the efficiency with which they are used by employers.

Discussion of such factors automatically emphasizes the complexity of labour market processes. It highlights the dangers of seeking purely educational solutions to problems which, at root, are of the labour market's own making. But it also draws attention to lack of flexibility in the provision of higher education which limits its potential economic value.

This brings us to the question of style. In a sense the scarcest commodity in the market for highly qualified people appeared to be information. By supplying much better data and by providing commentaries on recent developments and assessments of the future perhaps we could achieve the best of all worlds: greater efficiency, more equity and an education system which has been enriched rather than impoverished in academic terms. The ruling ethos of our institutions of higher education could then remain intact. The seminar thought that such benign results were not to be expected. This did not mean that the call for regular monitoring of the labour market was a mere technical aside. Great stress was placed upon the need to create a much better informed climate of opinion about higher education and the labour market and to provide decision makers at all levels with guidance on the labour market context in which they make choices. However, most participants were dissatisfied with the institutional framework which governed these choices and the financial incentives faced by decision makers.

For a number of participants this was enough to justify a move towards greater decentralization of higher education, motivated more by student preferences but accompanied by government intervention to deal with particular problems. Intervention could take the form of changes in the financial implications which alternative educational choices might have for students. It could operate through subsidies to institutions to help them to plan and develop programmes of study in advance of student demand materializing to the extent ultimately envisaged. It could encourage closer engagement between employers and educationists to improve education and training of certain categories of highly qualified manpower. Educational institutions would receive a much higher proportion of their income from fees accompanying the registration of students. They would be exposed much more than at present to pressures emerging from the market for educational opportunities and the style of institutional decision making would need to change to reflect the sharper influence of economic reality and the more explicit indications of the financial viability not just of different courses but also of departments.

As described in this chapter, a majority of participants were unwilling to go as far as that. Some clearly felt that there was scope for modifying the existing system but most were as reluctant to put their faith in that course of action as they were to support radical reform.

Doubts about the effects of introducing a good labour market information system without also attending to other aspects of the problem extended further than the deficiencies of higher education. The lack of coherence and consistency in employers' labour market strategies attracted much comment, as did the failure of successive governments to think far enough ahead about policy on public sector employment and incomes or on expenditure on industrial investment and research. Great effort by the higher education system could well come to nothing unless supported by marked improvements in these areas.

So higher education does not stand condemned alone. It joins the ranks of British institutions with whose individual behaviour we can sympathize but not without a certain disappointment that each has failed to rise above the difficulties of its position to give a more inspired performance.

Government and employers, as well as educationists, should seek to tackle labour market issues at a much more sophisticated level than that reached in the old debate about manpower planning. Labour market evidence does not suggest that higher education has failed industry any more than it suggests that industry has failed higher education. Educationists need not fear the prospect of regular monitoring of the labour market for it is likely to help to clarify issues and, as in the case of scientists and engineers, may sometimes provide a defence against industrial criticism. On the other hand, the outcry against crude manpower planning might obscure a general distaste for recognizing the legitimacy of market imperatives in planning the evolution of the higher education system. Has there not been a tendency for antipathy towards the labour market to cover a reluctance to develop and extend the market for educational opportunities? Perhaps a different language, less redolent of the market economy, would help to reconcile higher education to discussing its future structure in terms of its ability to stimulate and satisfy new demands for educational experience. But those who need such balm are hardly likely either to promote the contribution of higher education to faster economic development or to recapture the spirit and achieve the reality of earlier hopes for its contribution to greater social equity. Academics and educationists must decide which market imperatives are acceptable. Further work needs to be done before concluding that risks of a radical decentralization are worth taking but it is surely time to look hard at this option.

What confronts higher education is the possibility that the pursuit of wider access will call for changes in the structure which are similar to those implicit in proposals emphasizing the need for progressive decentralization and the creation of a more vigorous market for educational opportunities. It could be that the form of response most likely to meet the needs of the labour market is also likely to promote the interests of students to best effect. Resistance to change would then be seen for what it often is: the prevarication of producers at the expense of consumers.

NOTES

1 Chatham House rules applied to the seminar discussion and participants' views reported in this chapter are unattributed. When quoting from a previous chapter, however, the name of the relevant author is given. More general references to these chapters are also made in order to avoid undue repetition of some arguments set out fully elsewhere in the book.

2 Gareth Williams (1981) 'The main policy issues facing institutions of higher education in Britain in the 1980s to 1990s'. Background paper for Leverhulme seminars (mimeographed).

3 *New Society* 31 July 1975, 247-8.

4 The basis for this and other international comparisons prepared by the European Institute of Education tends to inflate the age participation rates estimated by about 20 to 30 per cent (the true rate for the UK would be 14 per cent in 1975) but they represent the best guide to the relative positions of different countries. See Education, Science and Arts Committee (1980) *The Funding and Organisation of Courses in Higher Education* vol. I, Annex 6.

5 This need not imply subsidizing investment over the long term though in practice it would probably happen.

6 No attempt was made during the seminar to spell out in detail the kind of information required and the institutional framework within which it should be collected and considered.

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